PUBLIC WORKS

April 1953

CITY, COUNTY AND STATE

ivil Defense for Water Supplies

esign Details on Accelo Filter System

actical Equipment for Highway Maintenance

ew Sewage Plant is Showplace of City

ream Classification and Water Use Zoning

ggestions for stablishing Street Grades

Clarence W. Klassen is Chief Sanitary Engineer of the Illinois State Department of Public Health. **See page 24 of this issue for more data.**

Landscaping
Paving - Grading with
HUBER MAINTAINERS

Hartford Contractor Keeps Two HUBERS Busy

Service station installations, roadways, parking areas and playgrounds are typical jobs in which the Kessler Construction Company of Hartford, Connecticut, specializes. They serve an area within a 50-mile radius of Hartford.

A pair of Huber Maintainers helps them get work done quickly and efficiently. The Hubers perform a variety of jobs, including rough and finish grading. R. E. Kessler, who founded the firm in 1940, likes the over-all efficiency of the Hubers.

Let your nearest Huber Distributor give you the facts about this 6,000-lb., 42½ H.P. machine and attachments that enable it to handle nine different kinds of work. Or write us for a free 16-page booklet fully describing the versatile, dependable Maintainer.

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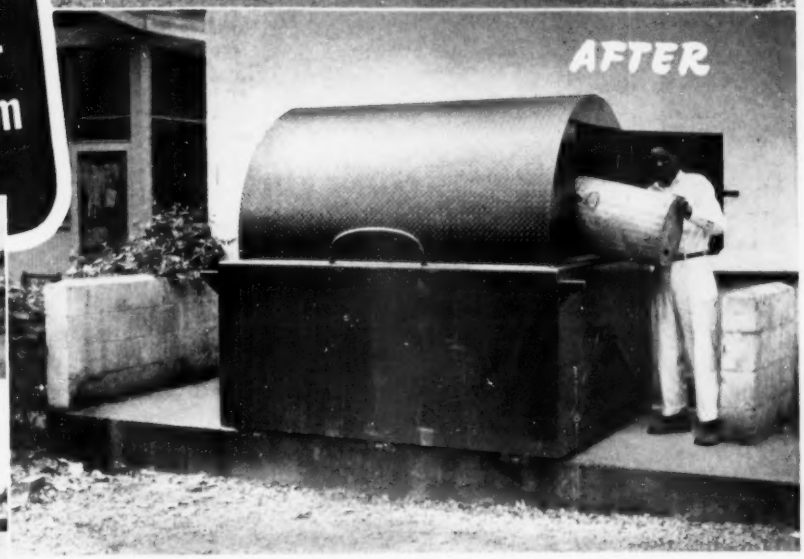
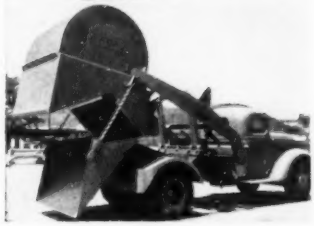
HUBER

Thousands of Rat Infested Conditions like this one are being Cured by the Dempster–Dumpster System





Dempster-Dumpster is shown above in the three simple stages of picking-up, hauling and dumping a container, completing the cycle in one to two minutes by means of hydraulic controls at the finger tips of driver in the cab.

In this case, a Lexington, Ky. groceryman had done all he could within reason to make the most sanitary condition possible with conventional cans, including the added expense of an attractive concrete platform. Yet, look at the difference after a 10 cu. yd. Dempster-Dumpster Detachable Container replaced the cans, crates, barrels, etc. Multiply this case many times to include other stores, hospitals, schools, market, apartment and housing areas. Then, you can see how your city, too, can eliminate rat infested, unsanitary bulk rubbish handling with the *Dempster-Dumpster System*.

On schedule, one truck-mounted Dempster-Dumpster, with only one man, the driver, handles scores of containers, one after another. This system eliminates loading crews because there is no re-handling of trash. In addition, one truck-mounted Dempster-Dumpster does the work of 3 to 5 conventional trucks, reducing truck investment and operation costs. Without question, the *Dempster-Dumpster System* is the lowest cost method ever devised for bulk rubbish collection! Investigate the *Dempster-Dumpster System* now! A product of Dempster Brothers, Inc.

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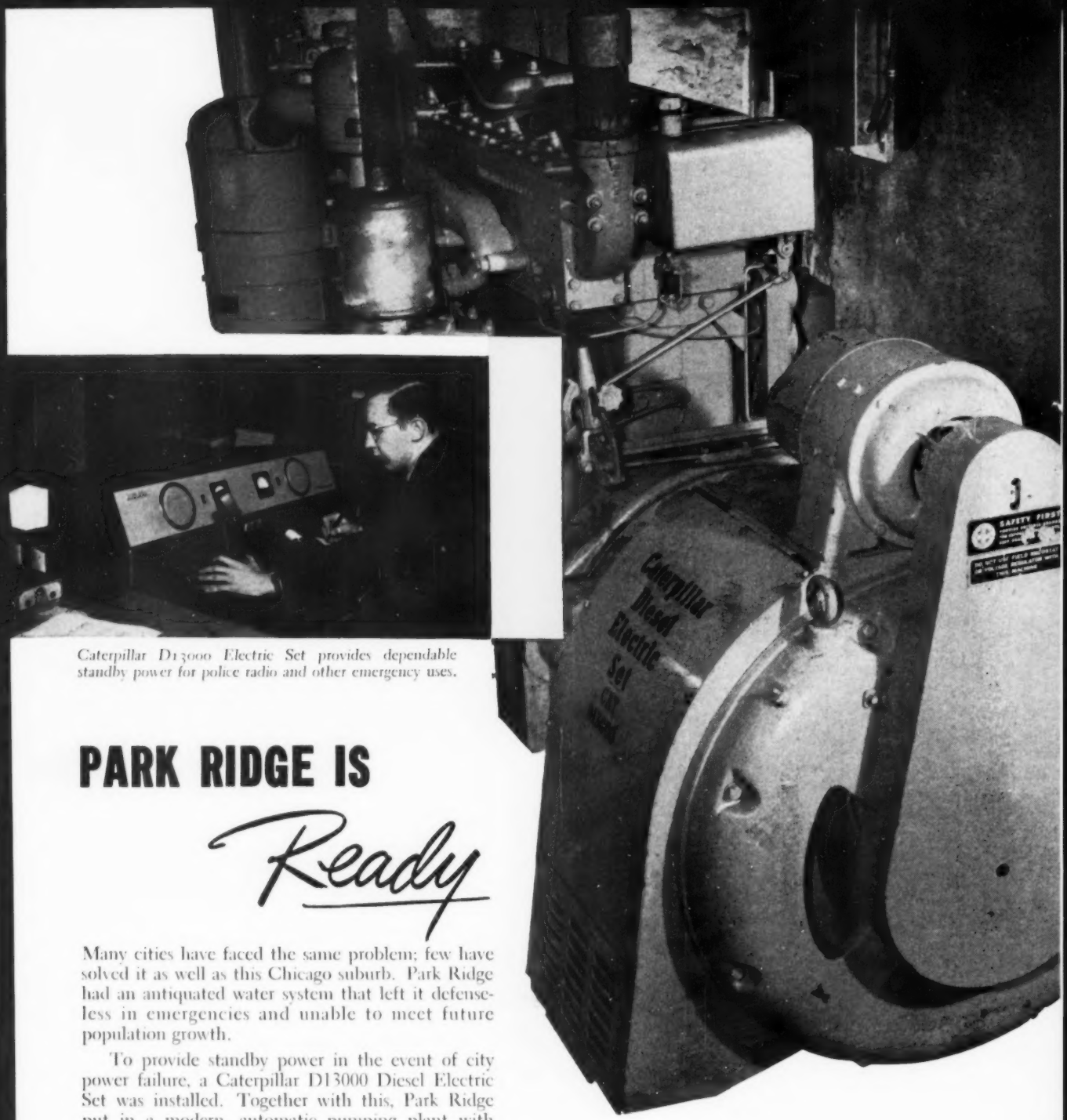

Caterpillar D13000 Electric Set provides dependable standby power for police radio and other emergency uses.

PARK RIDGE IS *Ready*

Many cities have faced the same problem; few have solved it as well as this Chicago suburb. Park Ridge had an antiquated water system that left it defenseless in emergencies and unable to meet future population growth.

To provide standby power in the event of city power failure, a Caterpillar D13000 Diesel Electric Set was installed. Together with this, Park Ridge put in a modern, automatic pumping plant with enough capacity to serve *four times* its present population. All equipment is underground.

The dependable Cat* unit protects against power failure at the water pumping station and is an invaluable power source for Civilian Defense, with extra capacity for the police radio and other uses.

Your city can benefit from low-cost Cat standby power, too. The D13000 and other Caterpillar Diesel Engines (ranging up to 500 HP and 315 KW) use economical No. 2 furnace oil without fouling. They require little maintenance and a minimum of operating knowledge. Ask your dealer for the complete story.

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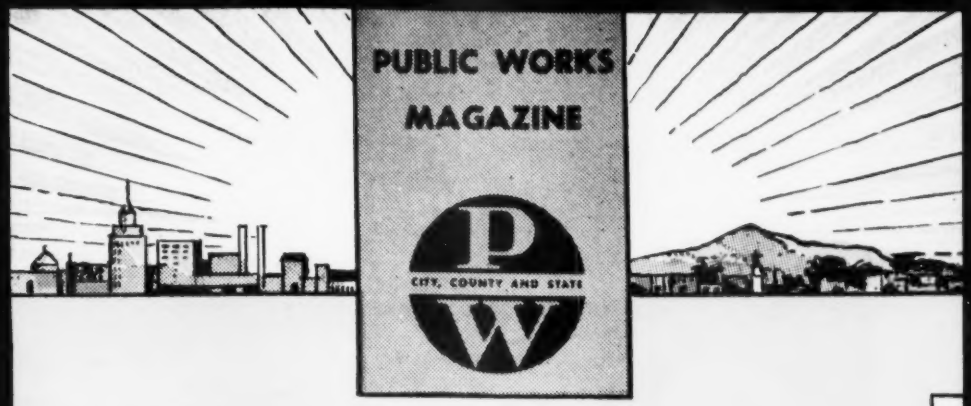

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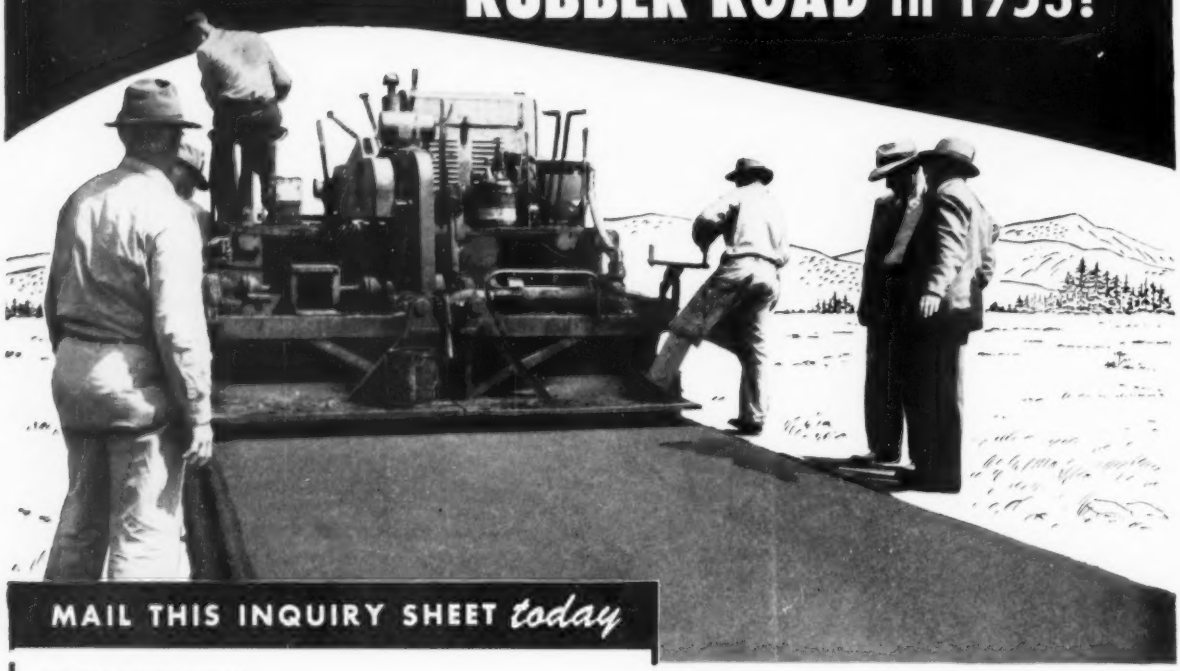
NOW is the time to plan for your test RUBBER ROAD in 1953!



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Depth of Top Course ..... inches	COVER MATERIAL
Aggregate Content .....%	Type of Aggregate .....
Aggregate Top Size .....%	Size of Aggregate .....
Bitumen Content .....%	Lbs. per sq. yd. .....

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☐ Please send information about new 30-minute motion picture on rubber roads

Many Engineers Planning Rubber Roads This Year

The biggest road-building season in America's history will soon be in full swing. High on the priority list of jobs in many states and cities will be a test strip of natural rubber-asphalt road.

Results from more than a score of test roads of natural rubber laid in the U. S. since 1949 give definite promise of a new era in highway building. Both laboratory and in-place studies indicate that natural rubber roads will last longer, require less maintenance and aid greatly in stretching overburdened highway budgets.

If you have not already investigated this newest highway development we urge you to plan now for a test rubber road installation during the 1953 paving season.

The Natural Rubber Bureau's Research Laboratory is staffed with experienced highway engineers who are ready to assist you with technical data on installing natural rubber roads.

Simply fill out the coupon and mail it to the

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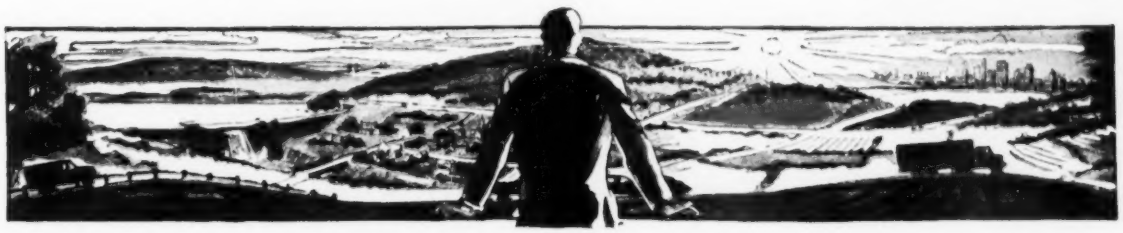
THE EDITOR'S POINT OF VIEW



Planning for Civil Defense Should Not be Neglected

THE picture of civil defense has been clouded by the inability of the national organization to sell its program to either the Congress or to local communities. The reasons for this lack of success are perhaps immaterial; but the failure is regrettable. Whether or not civil defense will ever be needed, planning for it brought out a lot of new thinking and created new concepts in engineering. It also brought a degree of helpful coordination between neighboring communities not previously considered possible.

Getting ready for civil defense also means getting ready for other disasters, though there will be a difference in the problems to be solved. Civil defense, for instance, presupposes intensive destruction of a relatively small area; a flood or a hurricane may cover a considerable portion of a state. Nevertheless, planning for one is, to a very large degree, planning for the other. Such preparation is important and every community ought to do its part.

Better Maintenance Equipment Needed

WHILE machinery is being very generally used in highway maintenance operations, there is still a need for new and improved equipment for certain purposes.

Clearing the roadside area of paper, bottles, cans, boxes, etc. is a regular job, especially after weekends and holidays. Gathering this material by hand is a slow and expensive procedure. Any equipment which will do this job will be much appreciated. Cinders are used generally for spreading over slippery road surfaces in winter. Large chunks of slag or cinders may injure the mechanical spreading equipment. Machinery for crushing and screening cinders is badly needed.

Signs and route markers along the highway are often made illegible by mud splashed by traffic. Washing by hand is not popular with the maintenance forces. Improved washing equipment, materials and methods would make one necessary job easier.

Existing cans for pouring bituminous material to fill cracks and joints in concrete roads are reported as not as efficient as desired. Small bituminous concrete mixing machines are coming into general use for the preparation of patching material. Generally the production of dry aggregate is the bottle neck in this operation. Small portable dryers with reasonably high output would meet a real need.

Salts of various sorts are used increasingly by highway departments. The salt is spread on the icy pavement and some of the present spreading equipment is not entirely satisfactory for this purpose. Equipment designed especially for the application of salt should give better service.

Small bituminous distributors of 300 to 600 gallons capacity are used for skin patching and similar maintenance work. It is common practice to fill these distributors from 50-gallon drums by hand. Equipment for mechanical filling of the distributors would make this operation much more efficient.

If anyone has devised new equipment or modified existing machinery to do these jobs easier and better, we shall be glad to pass the information along.

Slippery Roads

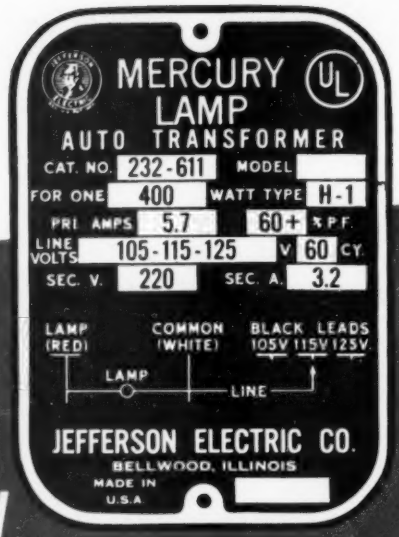
NOT so long ago the danger of slippery roads seemed to be past. Then after the war the subject became very active again. Several state highway departments became quite alarmed and started measuring the slipperiness of their roads and planning to correct the surfaces causing the trouble.

In most cases the road surfaces have not gotten more dangerous but traffic volume has increased and speed has been going up. Both affect accidents due to skidding.

Skidding, when there is no other traffic near, will probably not be very serious. We turned entirely around with a Ford on the old wood block pavement in the Chicago loop once. The street was clear and we only got scared.

Frictional resistance between the road and the tires decreases rapidly as speed increases. Thus skidding becomes more likely.

All of this points to more care in the construction and maintenance of skid resistant pavements. Keep the aggregate exposed and held tightly on the surface.



HERE'S THE NAMEPLATE TO LOOK FOR ON MERCURY LAMP TRANSFORMERS

Beauty, quality and compact design are all combined in the new Jefferson Transformers. Sparkling new "Dura-Gray" finish eliminates eye-sore installations—blends with every surrounding—makes pole-top installations clean, neat, and streamlined as well as weatherproof.

The new revised line of Jefferson Mercury Lamp Transformers is designed and manufactured to give *peak* performance and *greatest* economy from your mercury lamp installations. No expense has been spared in giving you a transformer with *every feature vital to ideal lamp performance.*

Jefferson Transformers are unmatched in performance and life because of these engineering advances:

- Three primary taps (not just two) are provided for a close match with line voltage. Long lamp life, full brilliance, positive starting, and maximum satisfaction result.
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- Press-fit riveted core for positive electrical uniformity in manufacture.
- Leads cannot be pulled loose as they are securely stapled to the coil.
- Solidly welded bracket has keyhole mounting slot and two holes for locking in position. *One* man can install a Jefferson Transformer.
- The new Jefferson line includes transformers for operation of EH-1 and JH-1 at extremely low temperatures.

Get the most out of your mercury lamp installations by insisting on Jefferson. Over a third of a century of specializing in transformer design and manufacture is a *real* guarantee of top-flight performance.

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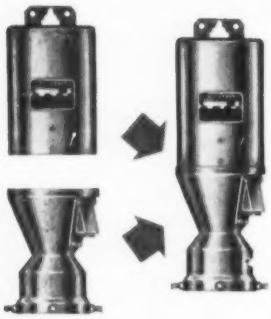

Only Jefferson has this Universal Adaptor!

All wall or post mounting Jefferson Transformers can be converted to pole-top models in minutes. Pole-top adaptor fits 2½" to 4" O.D. poles. Reserve stock cut to a minimum as one transformer fills most needs.

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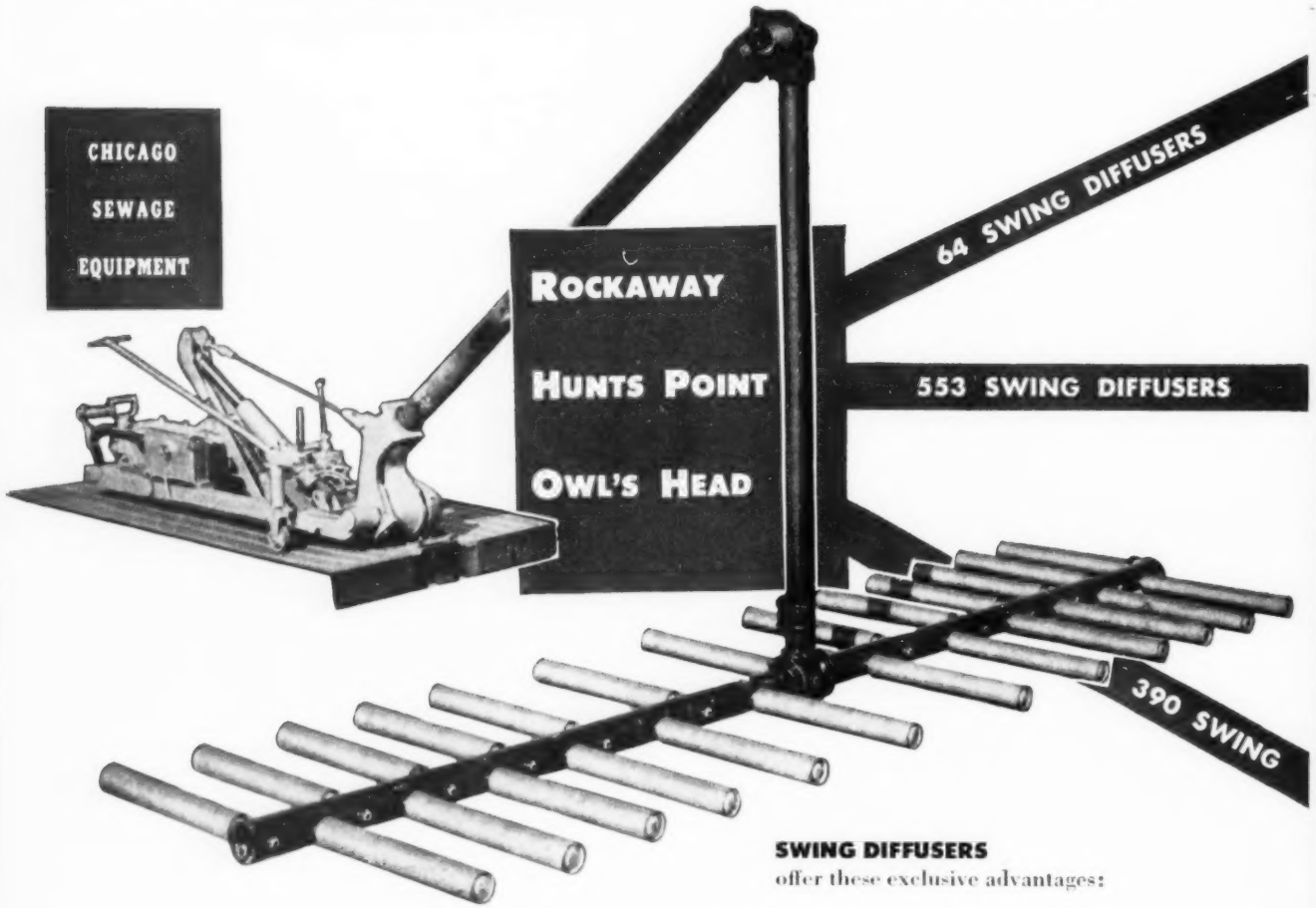
We are justifiably proud that Swing Diffusers were selected for all three plants where aeration is required. Once again Swing Diffusers have been selected by leading sanitary engineers, because they provide the most effective and economical method of aerating sewage.



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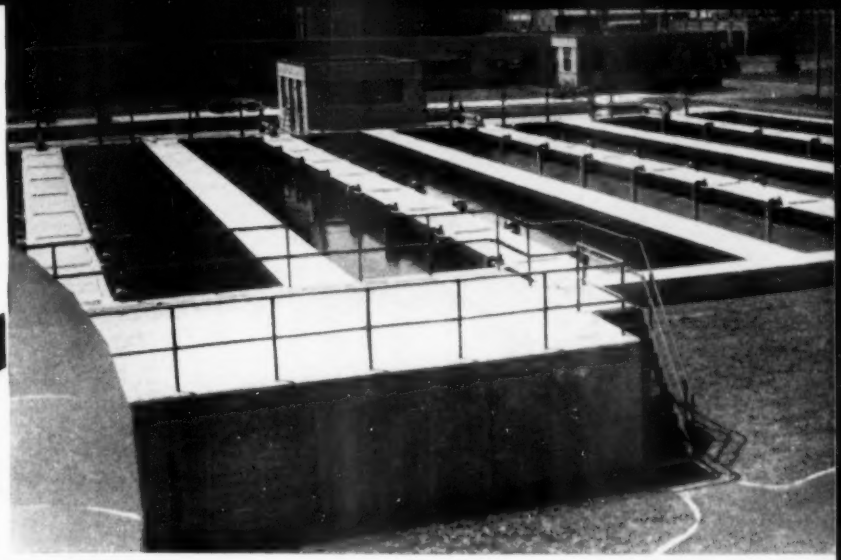

1452 PRECISION TUBES

Rockaway Plant Aeration Tanks N.Y. Dept. of Public Works, Division of Sewage Disposal. Metcalf & Eddy, Consult. Eng.

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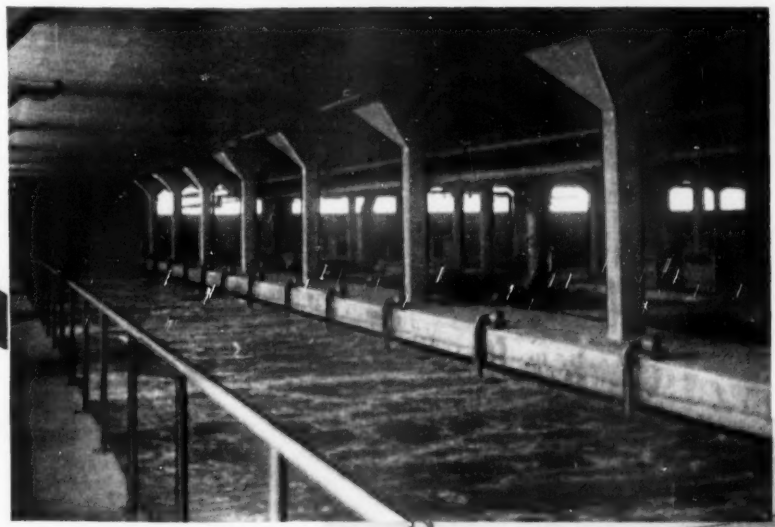


Owls Head Covered Aeration Tanks N.Y. Dept. of Public Works, Division of Sewage Disposal.

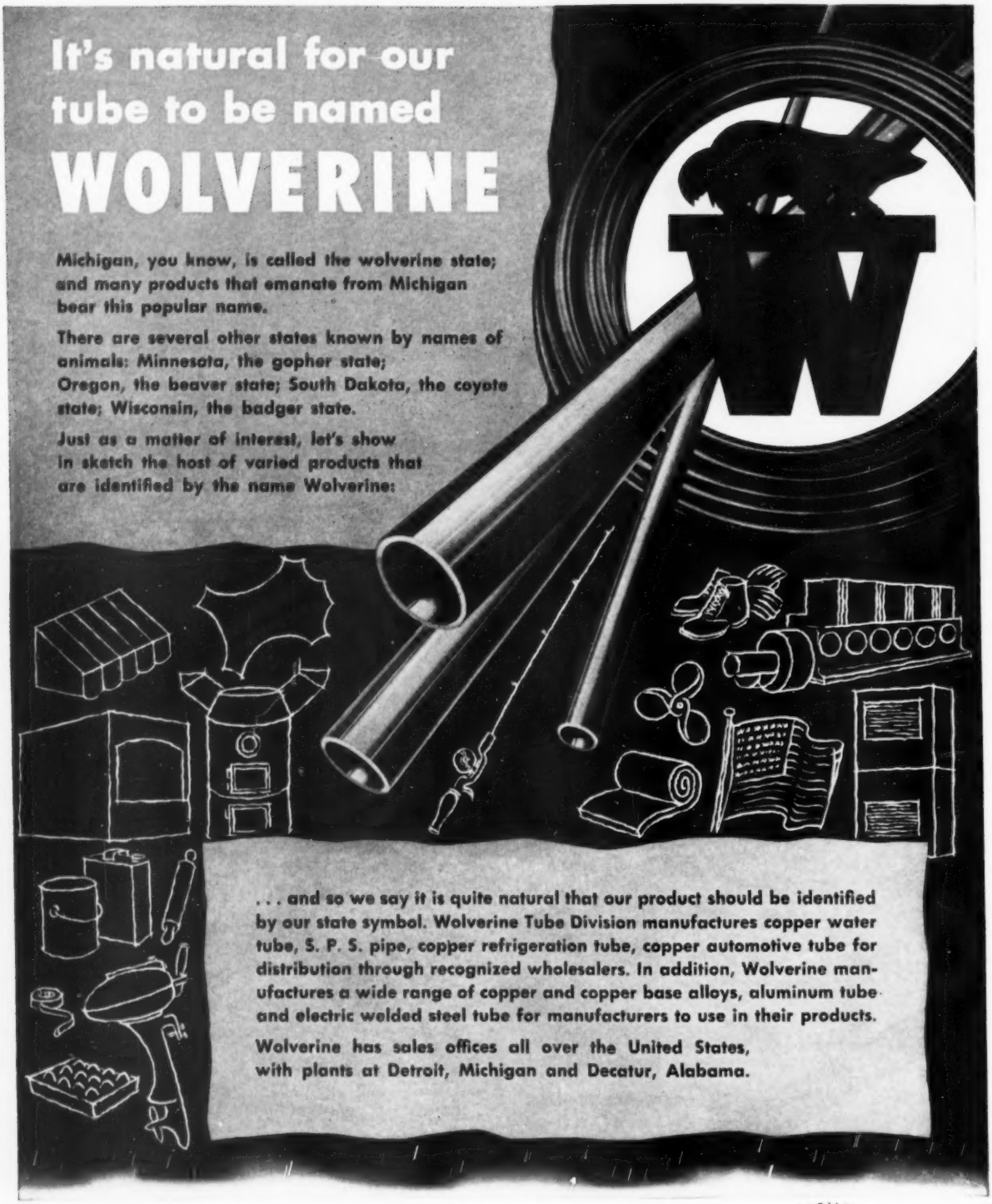
Exterior view showing the first plant to be constructed with aeration tanks completely enclosed.

It's natural for our tube to be named WOLVERINE

Michigan, you know, is called the wolverine state; and many products that emanate from Michigan bear this popular name.

There are several other states known by names of animals: Minnesota, the gopher state; Oregon, the beaver state; South Dakota, the coyote state; Wisconsin, the badger state.

Just as a matter of interest, let's show in sketch the host of varied products that are identified by the name Wolverine:



. . . and so we say it is quite natural that our product should be identified by our state symbol. Wolverine Tube Division manufactures copper water tube, S. P. S. pipe, copper refrigeration tube, copper automotive tube for distribution through recognized wholesalers. In addition, Wolverine manufactures a wide range of copper and copper base alloys, aluminum tube and electric welded steel tube for manufacturers to use in their products.

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- "O" RING SEALS
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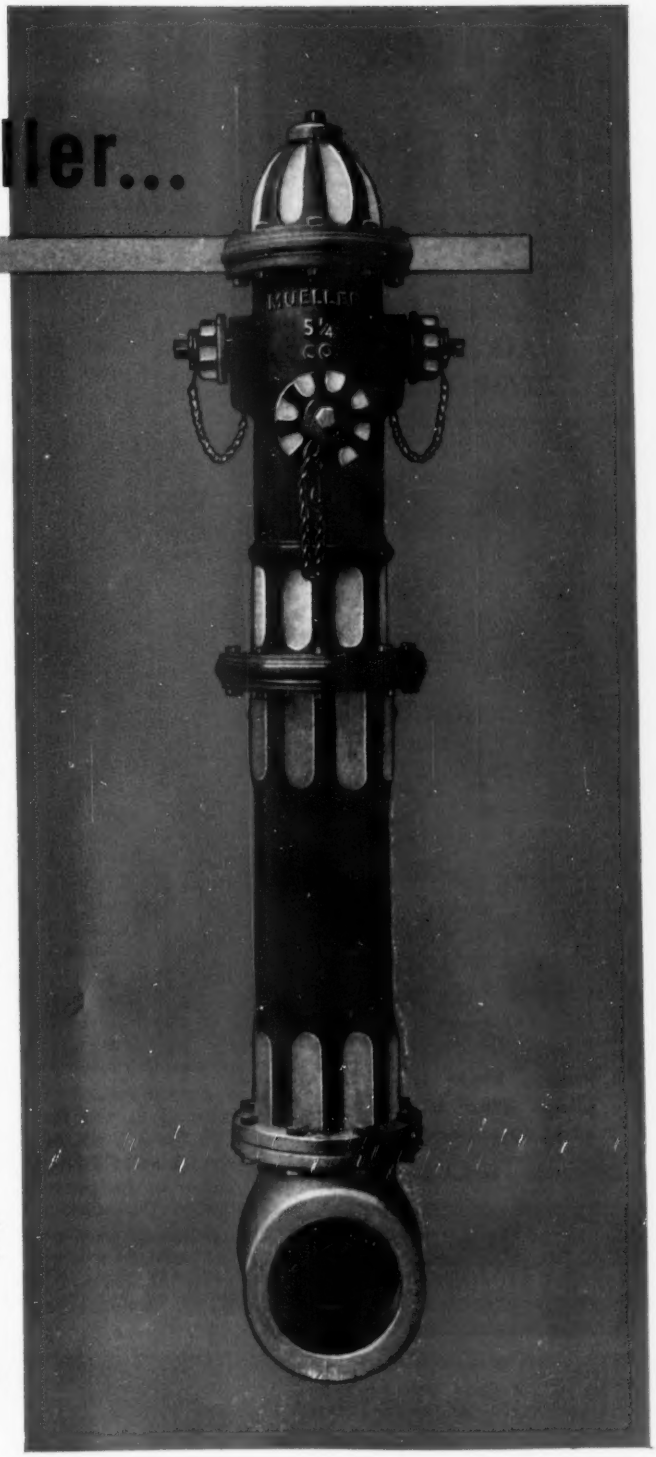
- BREECH-LOCKED NOZZLES
- DESIGNED FOR ABOVE GROUND MAINTENANCE



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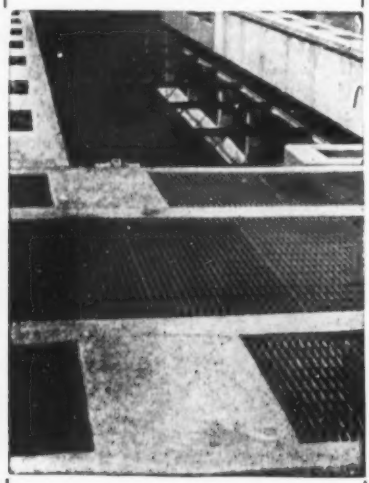

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UP FRONT FOR ADEQUATE ROADS

BY
LEO J. RITTER, JR.
New York University

Did You Know That a one-cent increase in the tax on a gallon of gasoline would cost the average motorist only about *14 cents* a week? This assumes that the average motorist gets 15 miles to a gallon of gasoline and drives 210 miles a week, or about 10,000 miles per year. If this increase were applied on a nationwide basis, it would mean an added income for highway purposes of about $350 million per year.

Expressway Impact on a Small Town: We keep picking up items from "California Highways and Public Works", the bimonthly magazine of the Division of Highways. This is not because we are California boosters, necessarily, but because of the interesting things they are doing.

In the January-February issue, for example, is a report detailing the results of a case study in Anderson, Shasta County before and after the construction of an expressway right through the middle of this community of about 2200 persons. A parallel service or "frontage" road was provided on one side of the expressway, while the other side of town was unaffected by the new facility. General objective of the study was to determine the effect of the expressway and the accompanying frontage road upon retail business and property values in the town.

Among the interesting conclusions reached in this factual study were (1) "Retail outlets on the frontage road showed (the) highest business gains in the community," and (2) "(the) Frontage road has not been a detriment to property values; there are indications of an increase."

The report was written by J. F. Kelly, Headquarters Right of Way Agent.

Selling: One of the papers given at the ARBA meeting in Boston was called "Public Relations in the Highway Field" by Vear Mann of the Louisville Automobile Club and formerly Director of Public Relations for the Kentucky Department of Highways. Mr. Mann's ideas make a lot of sense to us, particularly at this critical time in our highway history.

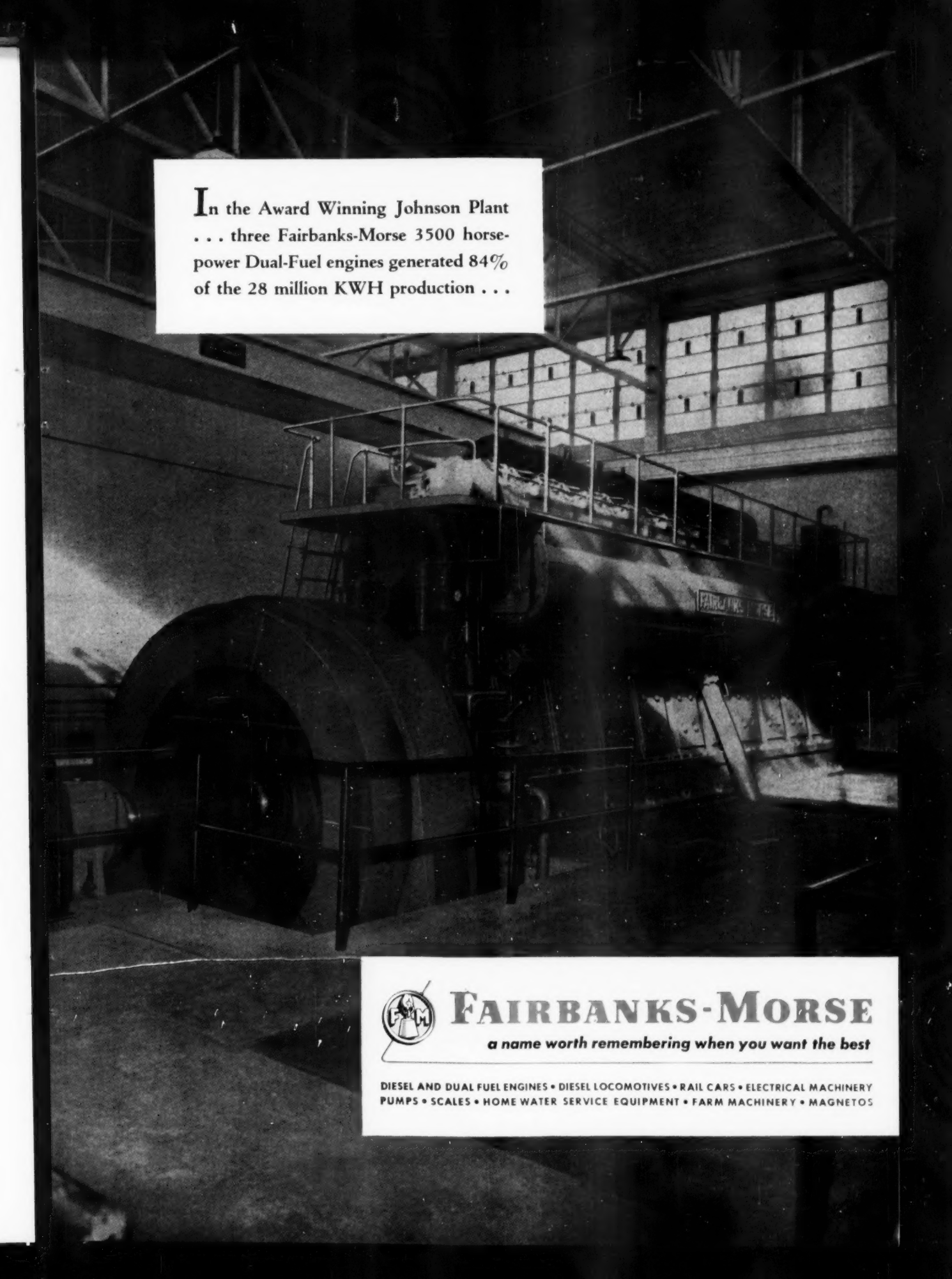
He emphasized that the highway program must be sold—not once, but over and over again—to three principal groups. First, to the politicians, who must be shown that "the best road program is the best politics." Second, to the public—who "must be sold on the fact that the department is moving toward the adequate road system they desire." Third, employees of highway organizations themselves, "so that they, in turn, can sell the guy next door."

Seems obvious, doesn't it? And yet, how many agencies in the highway field are really doing a bang-up, first-class job of public relations? Not many, that's for sure. This is something all of us must do, and do now, if we are going to continue to progress in highway transportation in this country. We can do much of the work ourselves, but it is increasingly apparent that we must have the aid of professional public relations people to get the job done right. Let's quit talking to ourselves about the highway problem and really get out and *sell*.

Highway and Street Capacities: We have had occasion recently to study once again the "Highway Capacity Manual" published by the Bureau of Public Roads. This valuable pamphlet is available from the Superintendent of Documents for 65 cents.

By highway capacity, in general terms, is meant the ability of a road or street to accommodate traffic. Detailed information on highway capacities is important in at least two general ways. First, in the design of new facilities, provision must be made for ample capacity to take care of the predicted traffic both at the time the new construction is com-

(*Continued on page* 109)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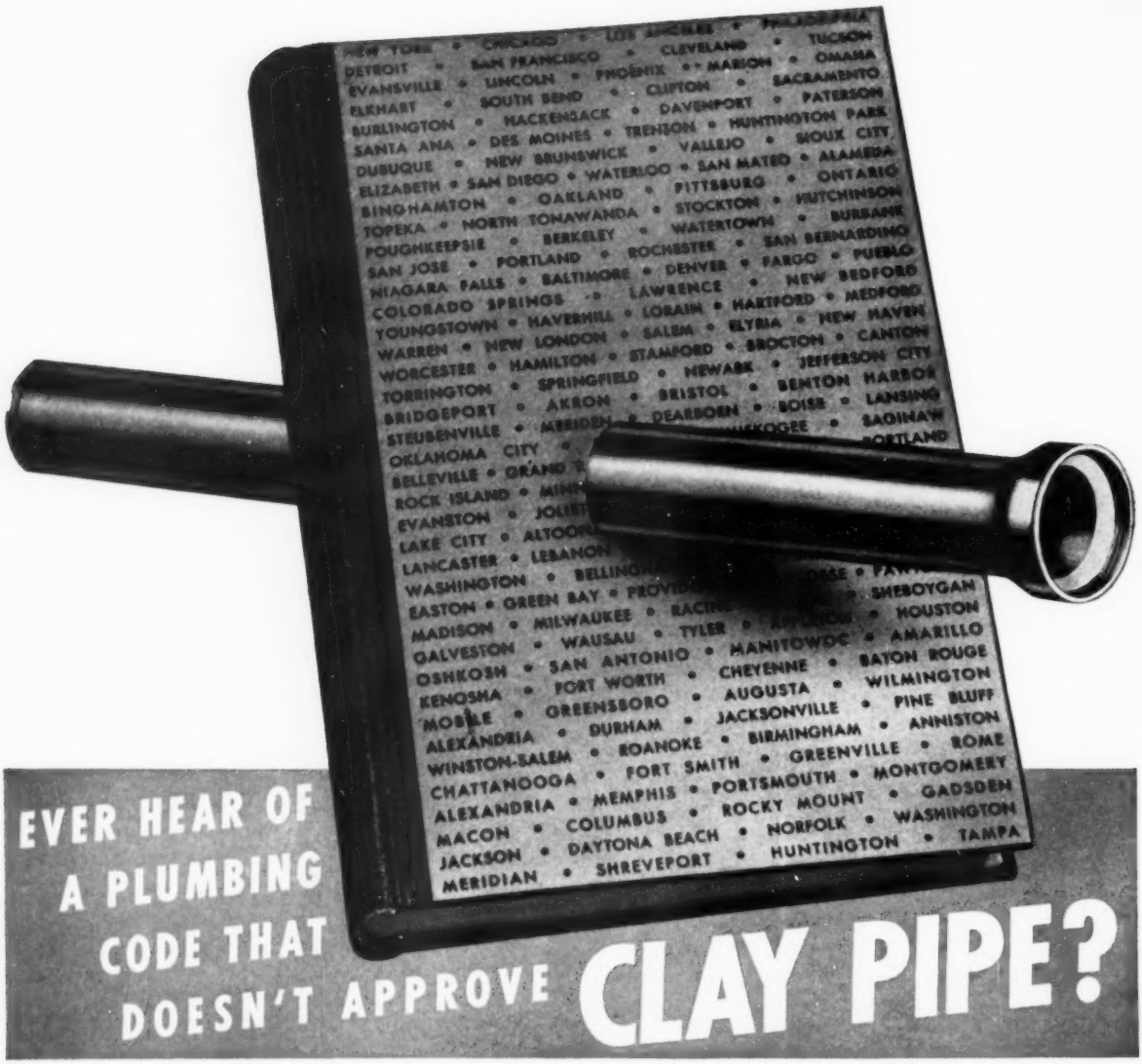
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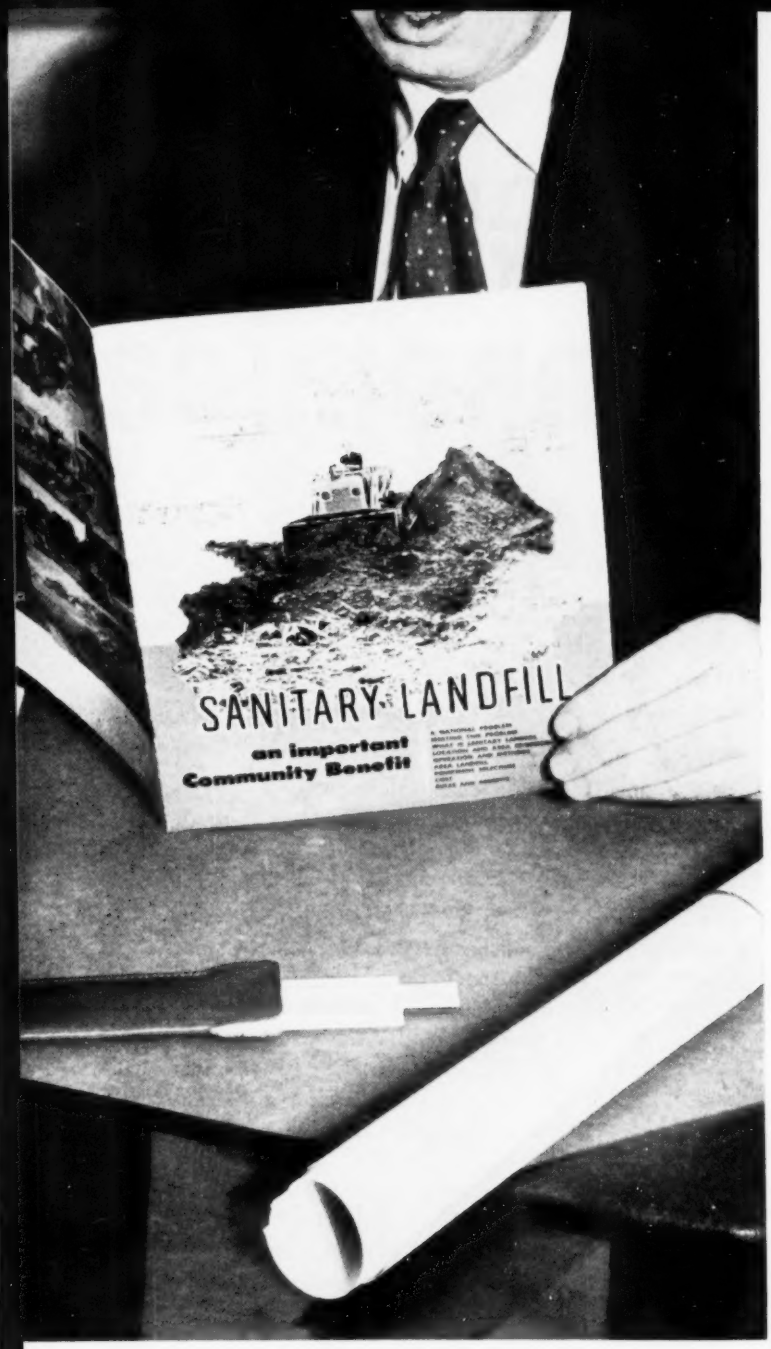

Here's real help for

Selling Community Health

New Allis-Chalmers booklet tells — illustrates how landfill method can meet problem of sanitary refuse disposal efficiently and economically.

Disposing of garbage is a recognized headache for any community too small to make incineration feasible. Explaining how the sanitary landfill method can do the job is a difficult challenge. That's why sanitation officials will find this new Allis-Chalmers booklet especially helpful.

Titled "Sanitary Landfill — An Important Community Benefit," it covers the subject step by step: (1) analyzing the problem, (2) how sanitary landfill meets it, (3) what the basic requirements for landfill are, (4) method of operation, and (5) selection of equipment. Photographs and drawings are used throughout the booklet to make the descriptions as clear as possible.

If your community faces the problem of sanitary, yet economical disposal of refuse, it will pay you to get a copy of this helpful booklet now. Just call your nearby Allis-Chalmers dealer (or write direct). He'll be glad to send you one and to give you any additional information you may want. Booklet No. MS-895-5210.

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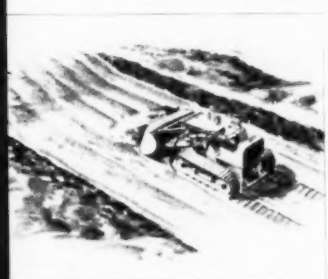
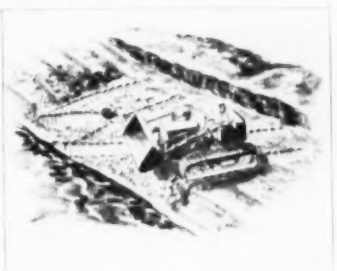
A-C THE FINEST LINE ON EARTH

Illustrations from section on trench method of landfill.

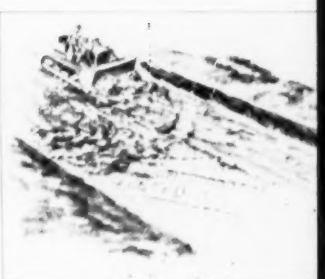


Trench 75-400 ft. long, 3 ft. deep, 15-25 ft. wide may be excavated, using dirt to build ramp along one side.

Incoming trucks dump from ramp into trench. Dumped refuse is then spread and compacted by crawler tractor.



Successive layers are compacted until a cell is formed in trench, consisting of refuse dumped in one day's operation.



Top and open end of cell are covered by earth seal taken from second trench adjacent and parallel to first.

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What? A still better cast iron pipe? Better than that which has served with unrivalled efficiency, economy and long life all over the world?

Yes, and beyond doubt! Modernized cast iron pressure pipe—with bell-and-spigot or mechanical joints—centrifugally cast and centrifugally cement-lined—is not only the most efficient and economical, but the most advanced pipe ever made for water distribution.

The centrifugal casting process—the most modern of all methods of producing cast iron pressure pipe—has been adopted by all members of the Cast Iron Pipe Research Association.

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Cast iron pipe is available with *cement mortar lining, centrifugally applied.* This is *modernized* cast iron pipe—with *sustained carrying capacity* for the life of the pipe. Since it is tuberculation-proof it has greatly reduced friction-loss with resultant reduction in pumping costs.

If you want pipe at its finest—at its highest efficiency and offering its maximum economy—your new mains will be laid with centrifugally-cast, centrifugally-lined, cast iron pipe. Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director. 122 So. Michigan Ave., Chicago 3.

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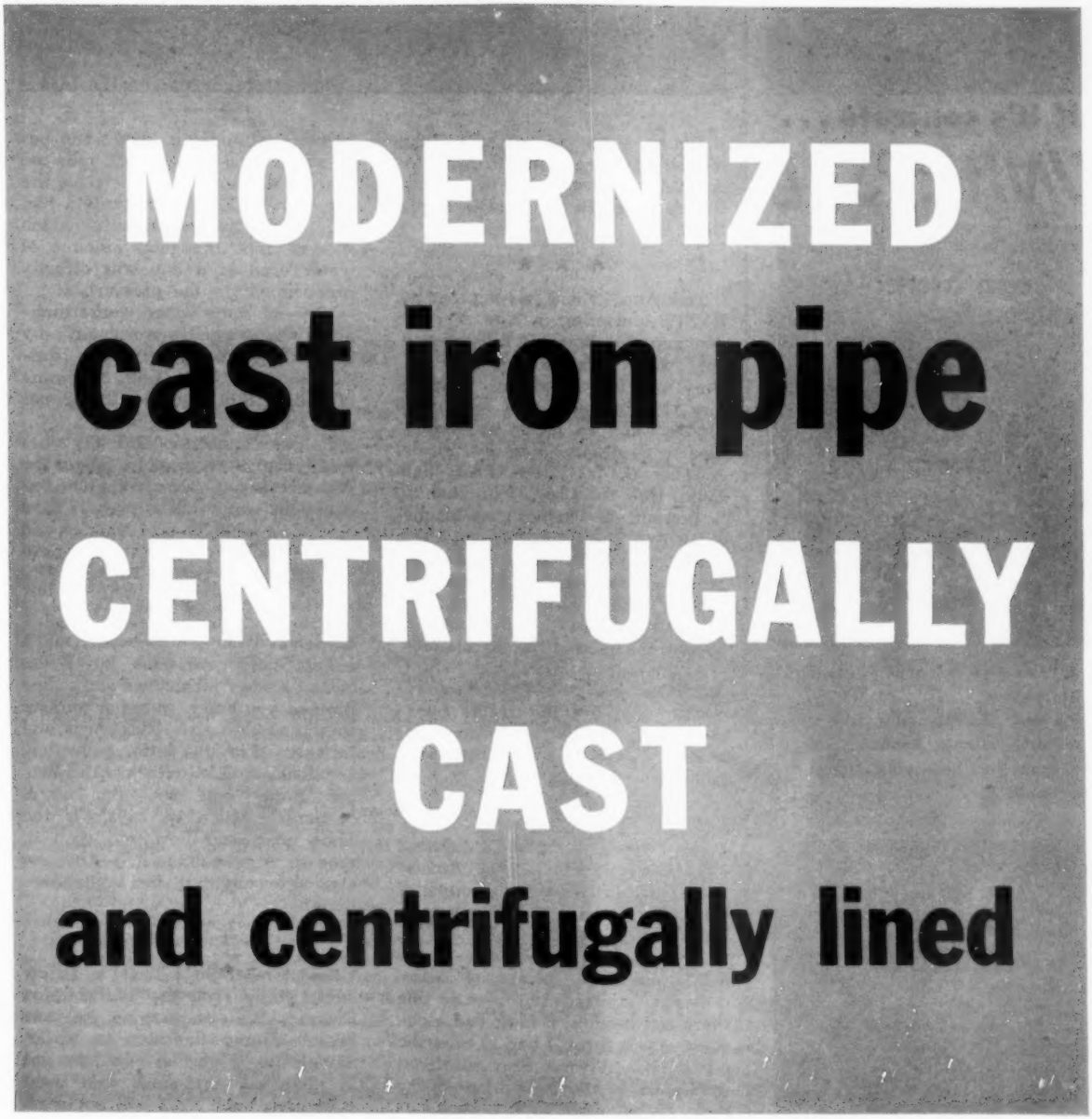

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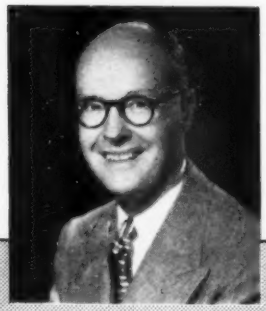

BY "DOC" SYMONS

H.T.M.A. — And when you read this it'll be less than a month until the AWWA Convention in Grand Rapids—May 10 to 15—Oh Happy Days!

★ ★ ★

Talk About Buck Passing—At the NYSIWA meeting in New York in January, Dr. David B. Smith, Asst. Dir., Engr. and Ind. Expt. Sta., Univ. of Fla., talked on "Respiratory Measurements of Activated Sludge" and the paper was scheduled to be discussed by Dr. Harold A. Thomas, Jr., Assoc. Prof., San. Engr., Harvard Univ., who couldn't be present. Dr. Thomas gave his discussion to Dr. Rolf Eliassen, Prof., San. Engr., MIT, whose plane was grounded. So Eliassen gave the discussion to Dr. Clair N. Sawyer, Prof. San. Chem., MIT, who came by train and who read the discussion.

Afterwards, W. R. (Red) Schreiner who was presiding remarked that in spite of the buck-passing, they made all the formulas sound so easy that they trapped a fellow into listening to it.

★ ★ ★

Purely Personal — No' to be different from several million other Americans, I laid off work for a couple of weeks in February to act as host to the Flu Virus.

My apologies to the boys in the P.F.T. office in Chicago; I intercepted a case meant for some one there and brought it back to Larchmont.—As a result I had to miss the annual N.J. AWWA Sect. luncheon in Newark in mid-February.—Sorry boys, I always get such a bang out of your meetings. I promise you I'll be there in the autumn.

★ ★ ★

It's An Idea?? — From my early days in a water works, I remember that when the customers were taking more water than we had available, we cut the high pressure back about 20 per cent and thus didn't run out of water. And Leon Smith tells me that at Madison, Wis., one time, the Nat. Bd. of Fire Underwriters had him run an experiment which showed that the total amount of water used in a day was directly proportional to the pressure.

Now—if some water works managers want to sell more water, why don't they just increase the pressure by, say 10 per cent; providing of course that the city is 100 per cent metered.

In this connection, did any customer near a water plant, where the pressure is high, ever complain because his water bill is greater than a friend's who lives at the far end of the distribution system, where the pressure is low?—Hmm—? ? ?

★ ★ ★

Collector's Items — Not only do I collect daffy definitions, but I also collect screwy nicknames and palindromes, you know, words or phrases that read the same backwards and forwards. For this latter collection, Les Jackson (Little Rock, Ark., Water Boy) sent me the word, "Chump", which he says, "is the same no matter how you spell it, read it, or pronounce it."—Any one else have anything for my collections?

★ ★ ★

I Read Somewhere — That a fellow out in Philly wrote the "Philadelphia Evening Bulletin" saying he was "agin" adding fluorides to water. Sayeth he, "Fluorides could be put in table salt for those who want glamorous teeth . . . I will not drink fluorinated (Sic) water"—So There, Too!

★ ★ ★

Luminous Quote — "Every river and stream can safely handle a certain amount of waste depending upon its runoff, climatic setting, and

(*Continued on page* 130)

Denver Water Works crew lowering 8" pipe. Five crews of 9 men each laid from 18,000 to 35,000 feet of new pipe per month (according to weather conditions) with the "QUICK-WAYS".

"QUICK-WAY" moves alongside trench backfilling as fast as men can tamp dirt. Note extra wide backfiller attachment which was specially built for this work.

8300 feet of new conduit was built in mountains to extend Denver's water supply. Here, two miles above sea level, a "QUICK-WAY" crane speeds work by moving heavy concrete forms.

"QUICK-WAYS"

Reg. U. S. Pat. Off.

vs.

1,000,000 Feet of Water Mains

Denver Municipal Water Works install nearly 1,000,000 feet of new mains in 6 years. Use 7 "QUICK-WAYS" to handle pipe, digging, backfilling—many other tough jobs. *Carl Anderson, City Superintendent, tells the story.*

Workhorse turns mudhorse. This 12' x 15' hole was excavated, backfilled with a 4 foot foundation of coarse rock for pipe to lay on, and covered over—all with the "QUICK-WAY".

Saves Labor Costs of 51 Men—"Our department has used *"QUICK-WAYS"* since 1946. During that time we have laid almost one million feet of new mains ranging from 3" to 36". Had we still been using the "A" Frame Derrick, or laying by hand, it would have been an impossibility. Where we formerly employed 60 men to a crew, only 9 are needed now. And with the *"QUICK-WAYS"*, they can lay 5 or 6 times more pipe.

Handles Many Tough Jobs—"We also used the *"QUICK-WAYS"* for backfilling trenches, loading trucks on cleanup jobs, dragline and clamshell work. When the ground got too spongy for heavy trenching machines, we moved in a *"QUICK-WAY"* with dragline bucket. Often times, this saved us a day or so delay. On line-leaks, we could pull a *"QUICK-WAY"* off a job many miles away—rush it to the trouble spot—and dig a hole in 3 minutes that would take a crew of men 5 or 6 hours.

Attachments Interchangeable in Minutes—"Another thing I like about a *"QUICK-WAY"* is that you can change attachments on the job in no time at all. And, it's a rare thing when one is laid up for more than just minor repairs."

"QUICK-WAY" Quality Construction—Denver is only one among many cities, counties and states using *"QUICK-WAY"* Truck Shovels to save time and work. *"QUICK-WAY"* gets to and from the job fast. Is quickly convertible—an attachment for every job with four booms. The Trench Hoe excavates, lowers tanks or pipe and backfills with one attachment. The Crane sets steel, loads or unloads logs, rails, materials, pours concrete, operates as a Magnet, Clamshell, Pile Driver, Hay Fork, Log Grapple, or Skull Cracker. Efficient too, as a Shovel or Scoop. *"QUICK-WAY"* has modern construction, all steel for strength and lightness, simplicity of design, numerous parts interchangeable, correct balance for truck operation, high capacity to weight ratio.

Tearing up a busy street to repair line leak calls for fast work. After breaking surface concrete with compressors, the "QUICK-WAY" backhoe dug a hole 6' x 4' x 10' in 30 minutes which would have taken 4 men all day.

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The Handie-Talkie® radiophone goes anywhere a fireman can go. Lightweight, rugged, it provides instant contact with all other fire fighting units.

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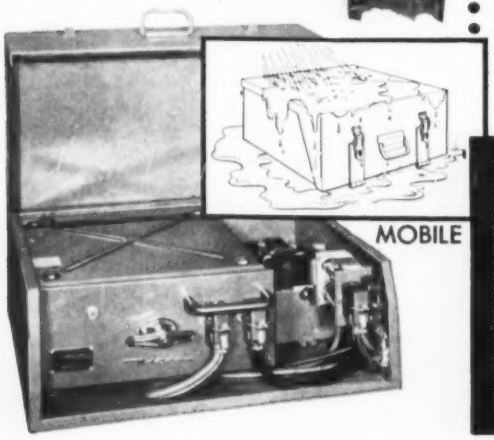

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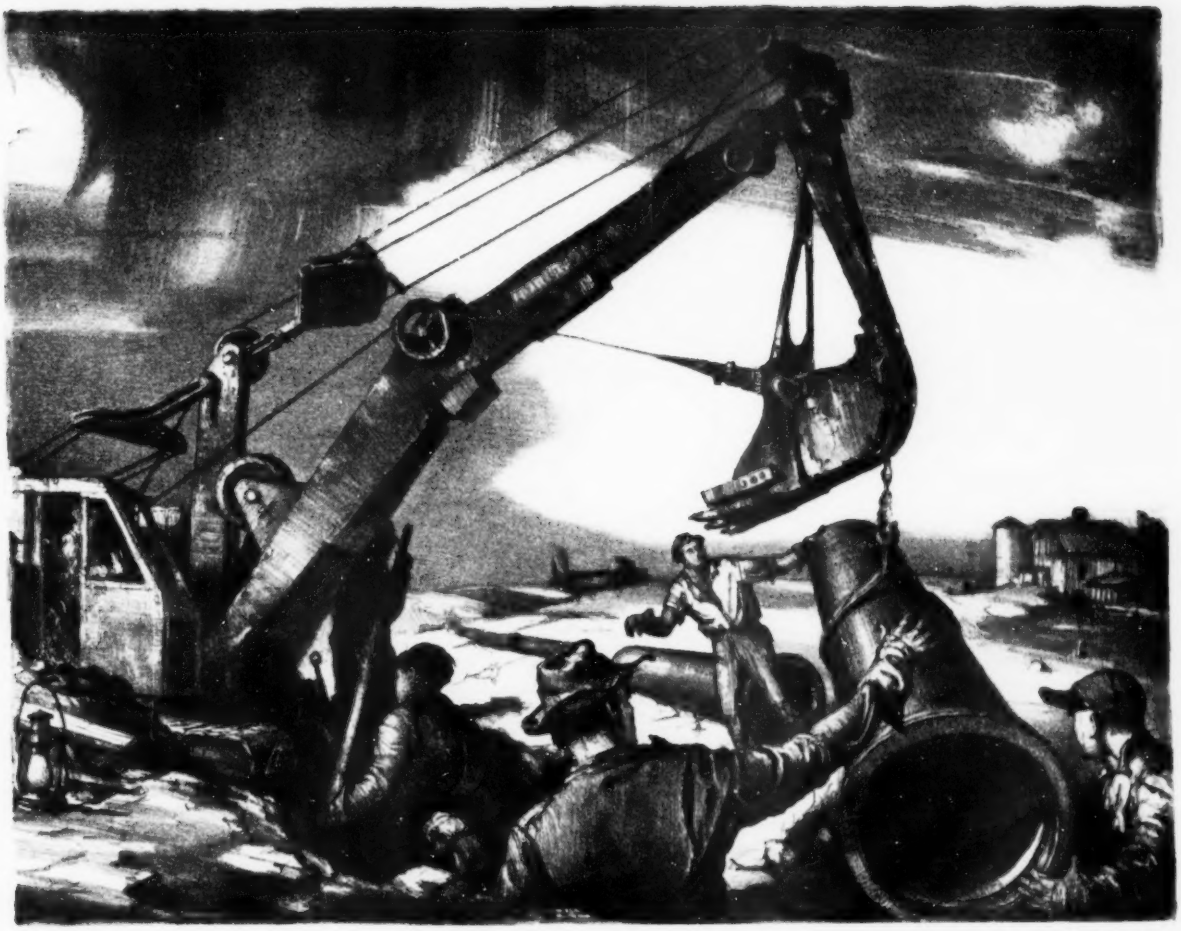

Lithographed on stone for U. S. Pipe and Foundry Co. by John A. Noble, A.N.A.

THIS RURAL SCENE is not an unusual background for cast iron pipe. The installation might be a water supply line for a city nearby. It could be a sewer force main leading to a treatment plant. Also it might be a gas transmission line for a city, in which case it would unquestionably be of the mechanical joint type.

U. S. cast iron pipe in sizes 2-inch through 24-inch are cast centrifugally in metal molds with bell-and-spigot; mechanical joints and plain ends. All sizes of flexible joint and integral flange pipe and all pipe 30-inch and larger are cast by the pit cast process. By whichever process the pipe is made, high quality is assured with the modern control methods employed during its manufacture.

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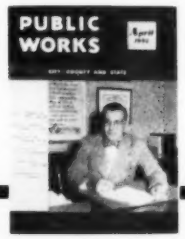

LEADERS IN THE PUBLIC WORKS FIELD

★

Clarence W. Klassen, Chief Sanitary Engineer of the Illinois State Department of Public Health and Technical Secretary of the State Sanitary Water Board, is responsible for the administration and technical activities of that Department's Division of Sanitary Engineering and also serves as Deputy Director of the State Health Department. In addition to these duties, he holds the post of Assistant Professor of Preventive Medicine, College of Medicine of the University of Illinois.

Widely known and highly regarded in the field, Mr. Klassen has been employed by the State as a sanitary engineer since his graduation from the University of Michigan in 1925, and has held his present title since 1935. His service has been continuous with the exception of three years as a major in the Sanitary Corps of the Army. In that capacity, he was in charge of the procurement and assignment programs for sanitary engineers for the armed forces, and later served as chief sanitary engineer of the Eighth Service Command.

He is active in professional societies, including AWWA, FSIWA, NSPE, APHA and ACS, and serves in executive capacity for several of them. In addition, he is Commissioner from Illinois of the Ohio River Valley Water Sanitation Commission and is a member of the Executive Board of the National Sanitation Foundation.

When time permits, he indulges in his hobbies of music and fishing for pleasant relaxation from his many duties and professional activities.

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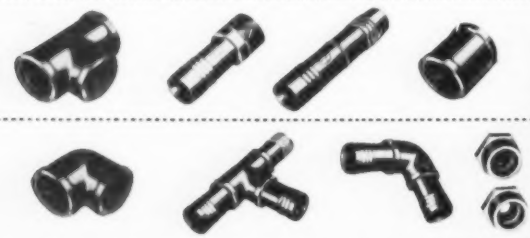

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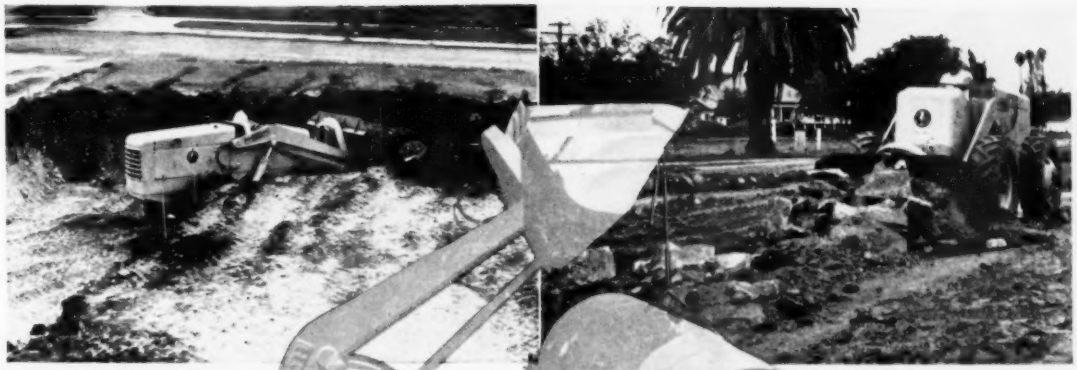


CELLARS.. ..STREETS

..OR SEWERS

4-wheel-drive does a job

Amazing is the word for the variety of work that public works departments and contractors find for their 4-wheel-drive "PAYLOADERS." In fact, the range of uses of these versatile tractor-shovels is limited only by the ingenuity of their owners and operators.

Dig! Load! Backfill! Stockpile! Lift! Carry! Strip! Push! Pull! — all these job capabilities makes them one of the busiest machines on *any* project — and the most in demand. They drive quickly to work under their own power and they get around the job fast, too — on pavement and ground and over curbs and sidewalks without injuring them.

See one of these powerful, multi-purpose "PAYLOADERS" in action and you'll be amazed at what it can do, too. Your "PAYLOADER" Distributor is ready to give you complete facts. See him today, or write The Frank G. Hough Co., 761 Sunnyside Ave., Libertyville, Illinois.

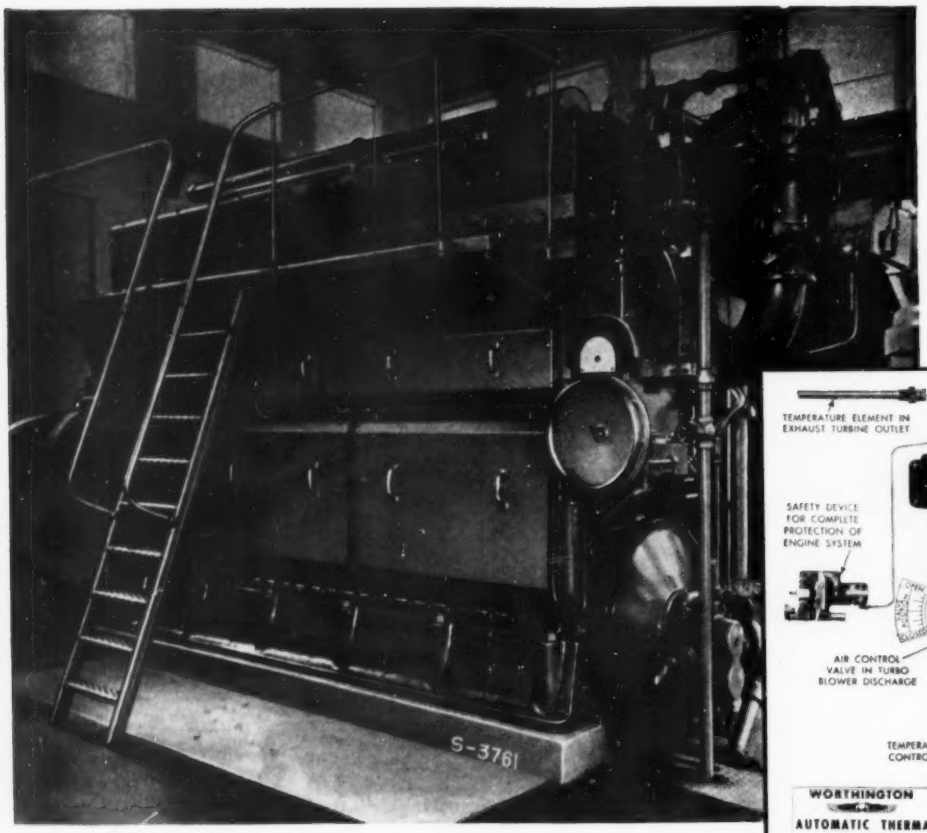
WRITE

WRITE for full information on any of the "PAYLOADER" models: Four-Wheel-drive HM — 1 ½ yd. and HR — 1 yd.; Rear-wheel-drive Models HY — 1 ¼ yd., HF — ¾ yd., HE — ½ yd.; Front-wheel-drive Models HAH — ½ cu. yd., HA — 12 cu. ft.

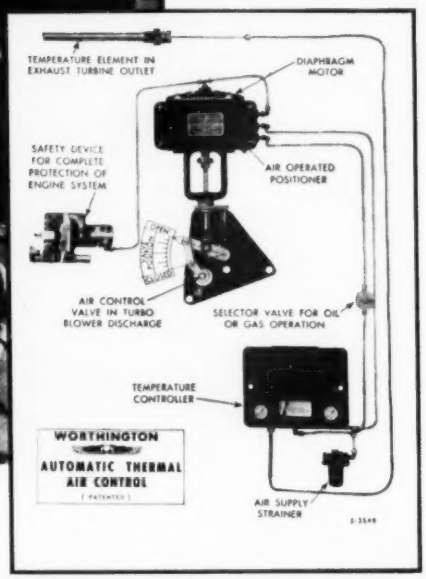
SAY "HUFF"

PAYLOADER®

THE FRANK G. HOUGH CO. • Since 1920



HANDLING INCREASING LOADS at the Vermillion, S. D., municipal power plant is this Worthington converted 840-kw dual fuel Diesel engine.


TEMPERATURE ELEMENT IN EXHAUST TURBINE OUTLET
DIAPHRAGM MOTOR
SAFETY DEVICE FOR COMPLETE PROTECTION OF ENGINE SYSTEM
AIR OPERATED POSITIONER
AIR CONTROL VALVE IN TURBO BLOWER DISCHARGE
SELECTOR VALVE FOR OIL OR GAS OPERATION
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WORTHINGTON
AUTOMATIC THERMAL AIR CONTROL
AIR SUPPLY STRAINER

WORTHINGTON AUTOMATIC THERMAL AIR CONTROL supplies correct air-fuel ratio to the engine cylinders *at all times* and *in direct relation to all load changes.*

Vermillion, South Dakota, meets new power demands

In 1949, the City of Vermillion, South Dakota, was faced with the necessity of meeting increased electrical load requirements on its municipal power plant.

To solve this problem, Vermillion plant engineers decided to have their Worthington EE-6 Diesel engine, installed in 1937, converted to a more powerful unit.

Worthington engineered the change-over of the 500-kw naturally aspirated oil Diesel to an 840-kw supercharged dual fuel Diesel—an increase of 340 kw. Engine speed was raised from 327 to 360 rpm.

Now, after a year and a half of heavy-duty operation, the Worthington converted engine has proved to be the most efficient and reliable power producer in the Vermillion plant.

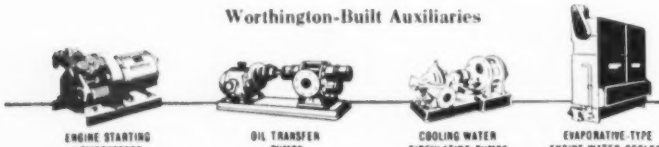
Four of the many exclusive Worthington features that insure top performance of Worthington dual fuel engines are:

1. Worthington automatic thermal air control for improved fuel economy.
2. Worthington dual plunger fuel pump for better, quieter combustion.
3. Worthington micro-metering gas valves—one for each cylinder—for equal cylinder loading and better speed regulation.
4. Worthington helical steel gear train for accurate and positive control of engine timing.

Worthington Corporation, Engine Division, Buffalo, New York.

E.2.5

Worthington-Built Auxiliaries



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Engines

Economical Continuous Power—Diesels, Oil and Dual Fuel, and Spark-Ignition Gas Engines, from 150 to 2100 bhp.

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CHICAGO LEARNED FROM EXPERIENCE

that only C-P-P* meets the BIG 3 REQUIREMENTS

The Chicago area's first Prestressed Concrete water supply line was installed in 1939. They've watched its performance carefully ever since.

That's why Price Prestressed Pipe was picked for two recent lines in the Chicago area . . . one 2,700 ft. line of 30" pipe and one 37,000 ft. line of 24". They wanted *long life, sustained high carrying capacity and great structural strength*—the "Big 3" requirements of water lines . . . and only concrete could do the job.

1. *Long life.* With Price Prestressed Pipe, only *concrete* is exposed. When buried in the ground, concrete is ageless as limestone . . . life is measured in centuries.

2. *Sustained capacity.* Properly placed concrete has the highest flow coefficient of any pressure pipe structural material . . . will never corrode or tuberculate under ordinary conditions. And the concrete core is there "for good," because it is a structural part of the pipe.

3. *High beam strength.* Price Prestressed Pipe makes your water line safe from external loads. It is shatterproof . . . and sudden and complete failure is all but impossible.

They picked Price Pipe for other reasons, too. It's easy to lay, easy to tap and watertight. It has great economy because of low original cost, low maintenance and extra-long trouble-free life.

Get Prestressed Concrete Pipe in *your* specifications. It will give your installations the same "Longest trouble-free service at lower cost" that Chicago enjoys. Ideal for sewer lines, too. Just mail the coupon for more information.

* only CONCRETE PRESSURE PIPE has the BIG 3 REQUIREMENTS

- LONG LIFE
- SUSTAINED CAPACITY
- GREAT STRENGTH

PRICE Pressure PIPE
PRESTRESSED CONCRETE
STEEL-CYLINDER PIPE

Price Brothers Company
1820 East Monument Avenue
Dayton 1, Ohio

Please send me, without obligation, the following literature:

- ☐ Check Sheet of Water Line Requirements
- ☐ Facts on Prestressed Pipe
- ☐ Price Pipe for Pressure Sewer Lines

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HOLMES-OWEN LOADER Proves Important WORK-SAVER

Provides BIG SAVINGS For These CITIES ➧ ➧ ➧

MORE AND MORE key cities are cutting operating costs the modern, *mechanical* way — through the use of dump trucks equipped with HOLMES-OWEN Loaders. For example, in the maintenance of streets, parks, airports and other public properties, the cost of many loading and cleaning up operations has been reduced as much as 50 per cent.

COLLECTING trash, leaves and broken pavement, handling sand, dirt, ashes and snow — these are a typical few of the many jobs that can be done faster and at lower cost with HOLMES-OWEN Loaders. On every job, *the driver alone* can load, haul and dump — without need of other manpower or more costly equipment. A Holmes unit can be installed on almost any 1½ to 2-ton truck. It lifts ½ yard per bucket, and loads the average truck in 4 minutes. *For full information, see your equipment dealer or write us for literature and prices.*

Partial List of USERS:

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- ★ **Bartow, Fla.**
- ★ **Chicago, Ill.**
- ★ **Dayton, Ohio**
- ★ **Kansas City, Mo.**
- ★ **Monahans, Texas**
- ★ **Philadelphia, Pa.**
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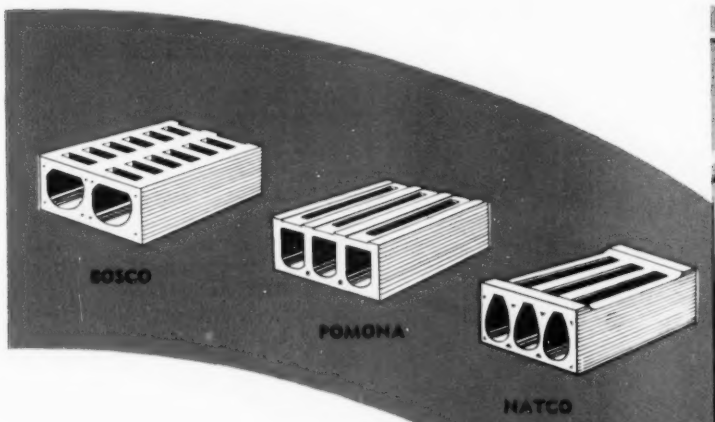
Manufactured by

ERNEST HOLMES COMPANY Chattanooga, Tenn.



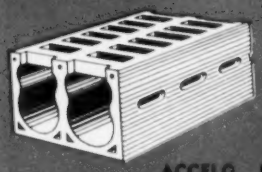
FOR BETTER TRICKLING FILTER RESULTS...

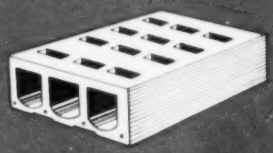
USE TFF INSTITUTE SPECIFICATION UNDERDRAINS

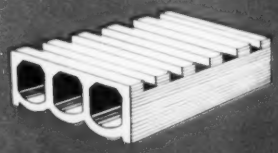
The scientific design of these *vitrified clay filter blocks* insures trouble-free operation for the life of the filter. They have large top openings. That means proper ventilation of all filter media and free discharge of the filter effluent at all times. They have smooth run-off channels. That means quick drainage and no clogging even with years of operation. The blocks are light in weight, self-aligning and easy for unskilled labor to lay. After they have been laid they are strong enough to work on and to support any depth of filter media.

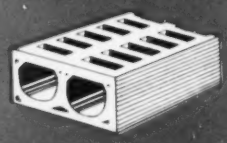
These modern underdrain blocks will carry applications up to 50 MGAD. They are best for all kinds and shapes of filters. They are used everywhere better operating results are desired.

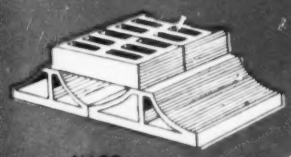
Use them to insure best results from your next trickling filter. Give it a *specification* floor. Use TFFI *vitrified clay filter bottom blocks*. For full engineering details write any member of this Institute today.











Here's the Payoff...

The Stockton, Calif., plant has TFFI specification underdrains. In July, 1952, when the peach canning season began, raw BOD was 360, final effluent 29; in August, the peak of the peach canning season, raw BOD was 775, final effluent 155; in October, last month of the tomato canning season, raw BOD was 323, final 62. This well designed plant handles a very difficult and fluctuating waste with excellent BOD and SS removals. The Office of Clyde C. Kennedy designed the plant.

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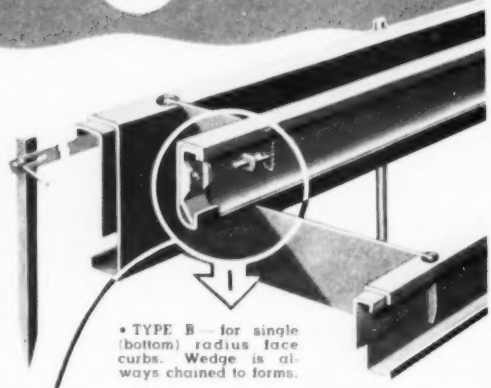
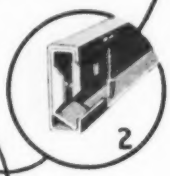
Heltzel BUILDS IT BETTER

CURB & GUTTER FORMS HAVE 3 INTERCHANGEABLE FACE FORMS

Heltzel steel forms augmented by various improvements through the years are the most rigid, advanced equipment obtainable. Your consideration of the many varied applications of these steel forms is respectfully invited. Write for Bulletin L-20.



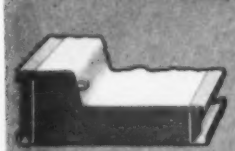
• TYPE B — for single (bottom) radius face curbs. Wedge is always chained to forms.



• TYPE A — for straight face curbs (no radii). Slide lock is rigid, positive.

• TYPE C — for double radius (S-shaped) face curbs. Sliding dowels secure upper and lower extremities.

... and 3 Optional FACE CURB FORM SUPPORTS



• Full depth curb and gutter division plate—provides maximum support, plus a full-depth contraction joint.

• Skeleton division plate — provides auxiliary support with minimum scoring of concrete.

• Overhead hanger — provides auxiliary support, plus ample space for hand finishing.

The HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO

Heltzel BUILDS IT BETTER — THE HELTZEL STEEL FORM AND IRON COMPANY — WARREN, OHIO

Flex-Plane — ROAD JOINT MACHINE COMPANY — WARREN, OHIO

Need more facts about advertised products? Mail your Readers' Service card now.

BOOKS IN BRIEF

FROST EFFECT ON ROADS

This is a committee report and covers the investigative work during 1951 in a number of northern states. All data show a decrease in the subgrade bearing values of roads at the time of the spring thaws. The strength loss, in Iowa, for instance, due to frost action varied between 38 and 84 percent. Ask for Bulletin 54, Highway Research Board, Washington 25, D. C.

FOUNDATION ENGINEERING

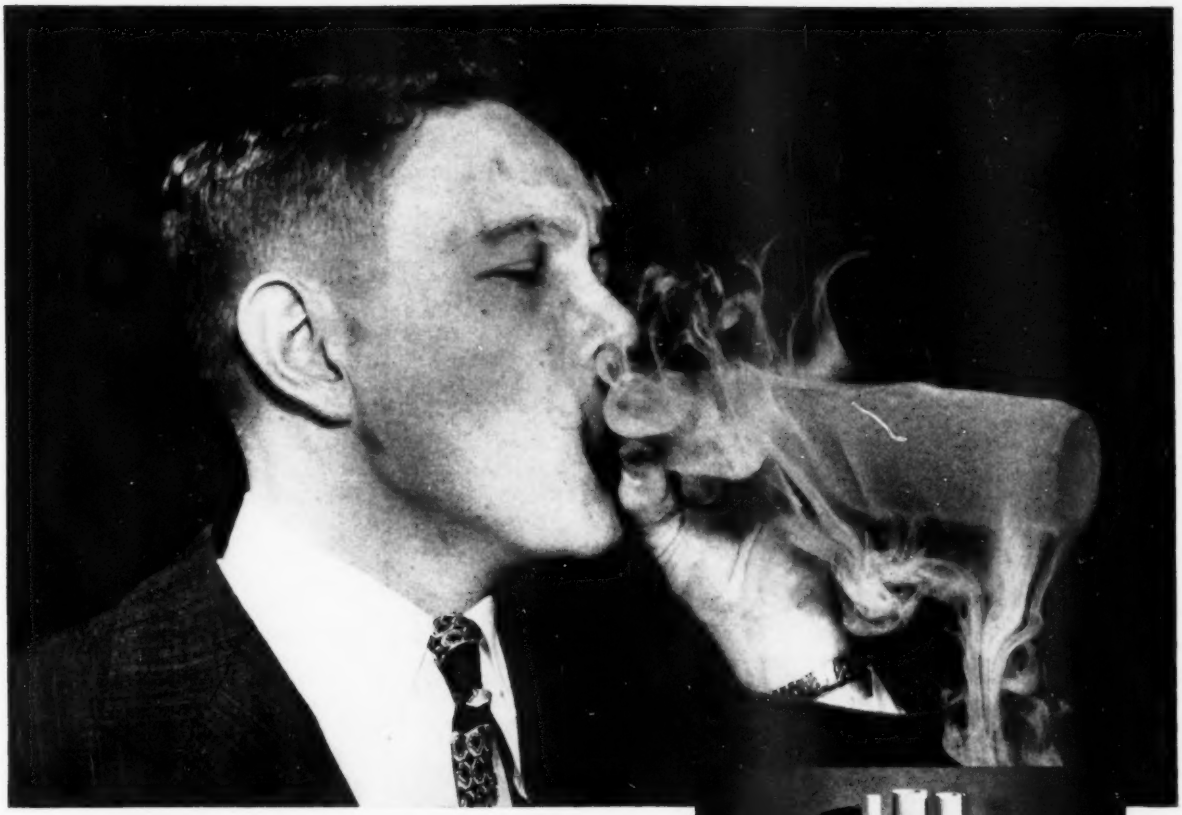
This book aims to develop and illustrate the utilization of the knowledge of soil mechanics. Part A is a suitable text for a course in basic soil mechanics. Part B contains descriptive matter concerning foundation practice. Part C shows the relationship between soil borings and laboratory data and the design of foundations. Part D presents the elements of structural design of commonly used foundations and retaining structures. This is a valuable and excellent book. 398 pages; ill. By Peck, Hanson and Thornburn. John Wiley & Sons, Inc., 440 Fourth Ave., New York, $6.75.

STATICALLY INDETERMINATE STRUCTURES

This book has the advantage of presenting the theory of structural analyses and also of relating this theory directly to structural design practice. Numerous applications of actual design problems form an important part of the text treatment. Though designed for college use, this book will be helpful to designing engineers. 328 pages; 303 illustrations; 61 tables. By Paul Anderson. Ronald Press Co., New York 10, N. Y. $7.50.

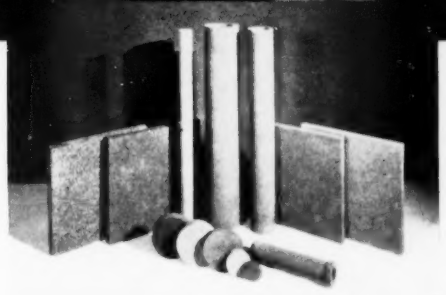
PROCEEDINGS OF THE HRB

The reports of the Highway Research Board always have a lot of valuable information in them. These 1952 proceedings cover the entire field of highway design, construction and maintenance; and such special fields as soils, roadside development, finance, administration and operation. A synopsis precedes each article for quick reference and understanding. $7.50 (foreign postage 30 cents extra) from Highway Research Board, 2101 Constitution Ave., NW, Washington 25, D. C.



SMOKE BLOWN THROUGH a Norton ALUNDUM* *seamless* tube escapes throughout the tube's entire area. Such a tube gives most efficient filtration and ease of cleaning by back washing. When selecting tubes for *your* specific application be sure they embody this important feature.

Why Norton seamless tubes give you better diffusion



NORTON ALUNDUM POROUS MEDIUMS are available as tubes, plates and discs in a wide range of sizes.

Only Norton ALUNDUM tubes have the seamless construction that means more uniform diffusion and enables faster, more thorough cleaning. And like all Norton porous mediums they're made with the patented *controlled structure* process that assures even distribution of pores — in the size and open-pore ratio that best meets your needs.

Cost-Cutters Over A Wide Job Range

In any form, Norton porous mediums have exceptional resistance to breakage, chipping, and acid and alkaline conditions. They're designed to perform better, last longer and cut your operating costs in many applications. For example: tubes for diatomite filters in swimming pools . . . plates for rapid sand filters in water filtration . . . plates and tubes for aeration in activated sludge treatment.

Get The Whole Story

See your Norton Representative for complete facts on how you can get more savings and satisfaction with Norton porous mediums.

Or write, describing your requirements, to NORTON COMPANY, 223 New Bond St., Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.

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Making better products to make other products better

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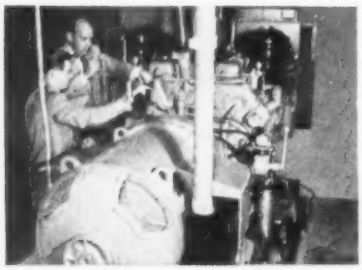
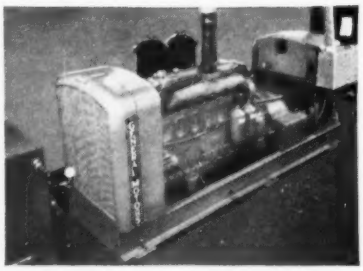
GM DIESEL *Stand-by* GENERATOR SETS



WJR—Detroit, Michigan, uses 200 kw. GM Diesel generator set as stand-by power for 50,000-watt transmitter. Compactness of unit permitted installation in garage adjoining transmitter building—eliminating cost of a specially designed building.



WKTV—UTICA, N. Y., uses a 100 kw. General Motors Diesel generator set for stand-by power. Set can be started remotely from the control room. Low vibration characteristic of engine permitted installation in room adjacent to transmitter and within 30 feet of studio.

If you are planning stand-by power, be sure to check the advantages of General Motors Diesel generator sets, listed briefly below. GM Diesel generators are meeting the exacting requirements of military service in all parts of the world. They supply emergency power for more than 1100 telephone and telegraph exchanges—for microwave relay stations, for hospitals, government buildings, banks, airports. There is a GM Diesel distributor near you who will analyze your power requirements and make his recommendations without obligation. Look in the yellow pages of your phone book for his listing, or write direct to us.

- Wide range of models—12½ to 200 kw., 220 or 440 volts, single or three-phase current.
- Excellent frequency and voltage regulation for the most exacting requirements.
- Powered by General Motors Diesel engines—dependable, smooth 2-cycle operation—low cost maintenance—easy to service.
- Built by one manufacturer—one warranty, one responsibility for both engine and power generator.
- Instant push-button power starting on safe Diesel fuel—or fully automatic starting. Immediate power, no "warm-up" period.
- Dependable starting—no spark-ignition system to fail because of dampness or corrosion—always ready to start.
- Easy to install—compact—lightweight—requires no special building, no special base. Complete instrumentation provided.
- Distributors and Dealers throughout the country.

DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
SINGLE ENGINES . . . 16 to 275 H.P. MULTIPLE UNITS . . . Up to 840 H.P.

It pays to Standardize on

GM GENERAL MOTORS DIESEL POWER

Write for Generator Set Catalog 6 SA 20.

Studies on Composting City Refuse

PILOT plant studies of composting city refuse have been carried on at the Berkeley site of the University of California Sanitary Engineering Research Project, Richmond, California. Complete results will be published shortly in Bulletin 9. Some of the principal conclusions were:

1. The time required for the process varies from two to four weeks depending upon the original paper content.

2. Satisfactory composting is possible with city garbage containing considerable paper and having a moisture content ranging from 40-60 percent.

3. Sufficient aeration is obtained by turning every other day; the frequency of turning may be lessened at the end of the cycle.

4. Garbage with an initial nitrogen content of 1.4 percent or more may lose some nitrogen during the process, while that with an initial nitrogen in the range of 0.5 to 1.0 percent generally gains in nitrogen.

5. Most rapid composting is obtained with raw material having a C/N ratio of 35:1 or less. However, composting proceeded without difficulty with any C/N ratio within the range tested; namely, 19:1 to 78:1.

6. The temperature of the compost pile rises to 50°C within one day, to 60°C within two to three days, and to 70°C within three to eight days. A temperature of 65°C is preferred because it insures a sufficient range to include all degrees of thermophilic conditions in various parts of the pile.

7. Bacteria, actinomyces, and fungi have equally important roles in the composting process. Bacteria account for most of the protein breakdown, while fungi and actinomyces decompose most of the cellulose and lignin. Actinomyces noted in this study seemed to thrive at temperatures between 48°C and 58°C.

8. Sewage sludge, raw or digested, may be added to normal garbage without altering the cycle. Nitrogen content of the original material is enhanced.

9. The addition of soil improves the appearance of the compost but decreases its value to plants, in that the nitrogen content is lowered.

Prompted by the large number of inquiries concerning composting on a limited scale by amateur gardeners, studies are being made on rapid composting of grass clippings, weeds, household garbage, etc.

LOOK JOE! SAW SMOOTH — STRAIGHT OPENINGS

for PATCHES & TRENCHES with a . . . Clipper CONSAW

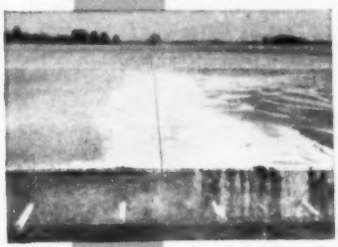
SAVE TIME — MATERIAL — MONEY by "SAWING BEFORE BREAKING" with a . . .

Save up to 50% in labor and material. Saw repair patches — water, gas, sewer and air line trenches in floors, streets, walks and highways. Save too, by sawing contraction joints in floors and highways . . . eliminate costly hand forming and spalling.

"4 OUT OF 5" BUY CLIPPER CONCRETE SAWS. Three-Point Suspension (see below) . . . the Patented Water Application which increases blade life and speed . . . perfect balance and dashboard controls for operating ease and maneuverability — these are the reasons WHY — "4 OUT OF 5" Buy Clipper!

Only minimum replacement material needed and is poured to straight, smooth edges.

Sawed lines confine breakout fracturing and speeds removal up to 50%.



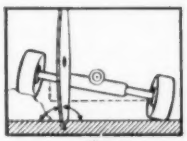
Contraction joints in floors or streets eliminates spalling, 50% less seal and are maintenance-free.

NEARLY 20 YEARS EXPERIENCE
Sawing Concrete of All Types

The unqualified Clipper guarantee of satisfaction is backed by world-wide experience, the ability to select the finest materials and the "know-how" to put them together.

YOU CAN DEPEND ON CLIPPER SUPERIOR DIAMOND BLADES

. . . guaranteed to . . . "Provide the fastest cut . . . at the lowest cost." Clipper alone can supply every necessary metal bond . . . in over 36 specifications.



THREE POINT "No-Bind" SUSPENSION

Three Point Suspension holds the blade straight and true in the cut — **eliminates** binding — drifting — sidewear and friction. Guarantees the **longest possible** blade life!

CLIPPER MASONRY SAW

. . . the ONLY saw in the world that will cut masonry materials of every size and description. Clipper outperforms them all for ONLY Clipper is "CONVERTIBLE" and has the Patented Features for **flexibility.** A Clipper Model to fit any job — any budget. Sold on FREE TRIAL . . . Priced from $265.

MODEL HD
15 MODELS
PRICED FROM $265

FREE TRIAL!

ORDER TODAY . . . on FREE TRIAL. Discover for yourself how Clipper will increase your profits by increasing your production at reduced costs. Clipper "ON THE JOB" FREE TRIAL guarantees satisfaction at *no obligation.*

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Clipper

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Now's the time to mail this month's Readers' Service card.

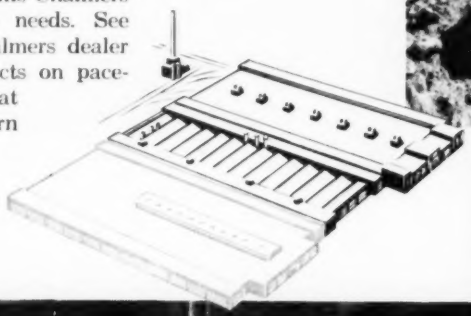
There's more to tractors than meets the eye . . .

The real "pay-off" value of any tractor to its owner is how it measures up to the standards set by today's modern production methods.

To meet these needs, Allis-Chalmers started from scratch and built *a line of tractors with a future*. Thousands now have been tested and proved on the toughest proving ground of them all, actual jobs, and they have more than measured up to expectations. Owners have found that these tractors set new standards of performance . . . that they give greater output with less down time . . . plus more profit, whether pulling, pushing, digging or dozing. Operators have discovered new ease and comfort in operation, too; and mechanics say these are the easiest-to-service tractors that they have ever worked on.

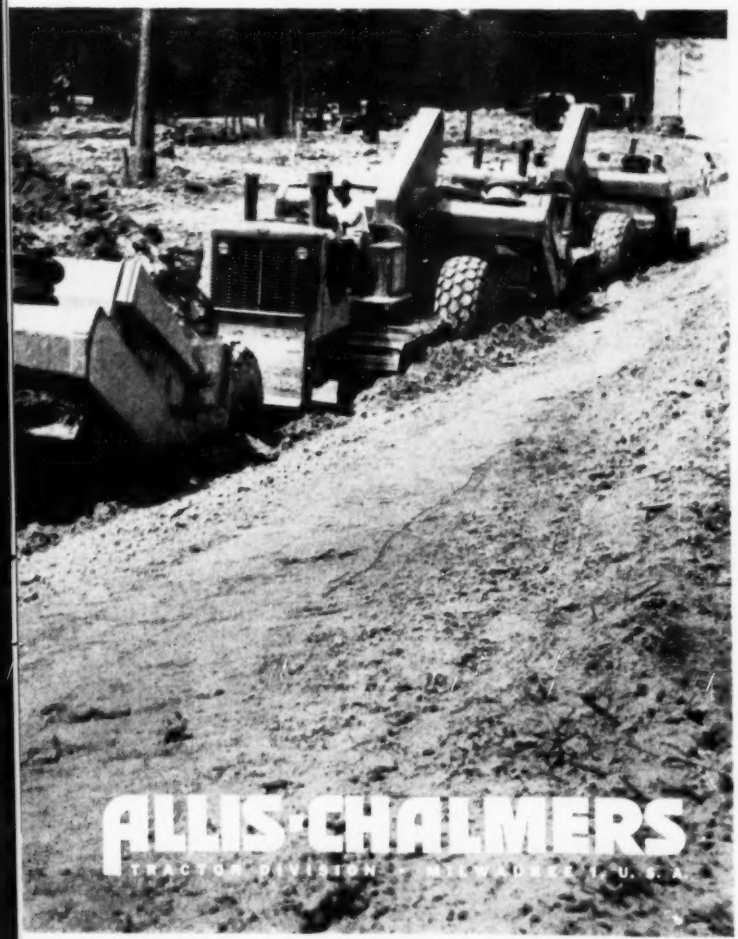
Yes, the "family circle" of users of Allis-Chalmers tractors is growing constantly. Many users who bought their first Allis-Chalmers tractor only a few years ago now have fleets of them, and many others who operate only one or two tractors have become Allis-Chalmers boosters.

This acceptance is the springboard behind a big plant expansion at Springfield, Illinois, which will enable Allis-Chalmers to meet *your* future needs. See your nearby Allis-Chalmers dealer now for the inside facts on pace-setting tractors that measure up to modern production methods.



From haul road to highway to heavy construction . . . wherever big production is essential to the job, this big HD-15 has more than proved its worth. With 109 drawbar hp. and 27,850 lb. weight, it works quickly, efficiently as a dozer, tractor-shovel, puller or pusher.

This 72 drawbar hp., 18,800-lb. HD-9 is making friends in every field because its power and weight make it ideal for dozens of today's jobs. And, operators can gain up to 25 percent more production on short dozing jobs because they can go from any forward to any reverse speed with just one shift.



The 40 drawbar hp., 11,250-lb. HD-5 is a versatile jack-of-all-trades for fleet owners as well as one-man operations . . . with hydraulically controlled Tracto-Shovel, it's equally useful loading bulk materials, dozing, digging basements, dozens of other jobs.

Here's real tractor teamwork . . . four HD-20's in a "train" — three pulling scrapers, one pushing — all working together for big production. With torque converter drive, they synchronize speeds at contact . . . automatically load at the fastest speed that job conditions permit, with less strain on operators and equipment. With 175 engine hp. and 41,000 lb. weight, the HD-20 is today's new yardstick of crawler tractor performance.

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You ought to see how things are buzzing in our Bermico plant these days.

We're happy there's such a demand for Bermico—that's why we're doing everything possible to make as much Bermico as we can—without sacrificing quality.

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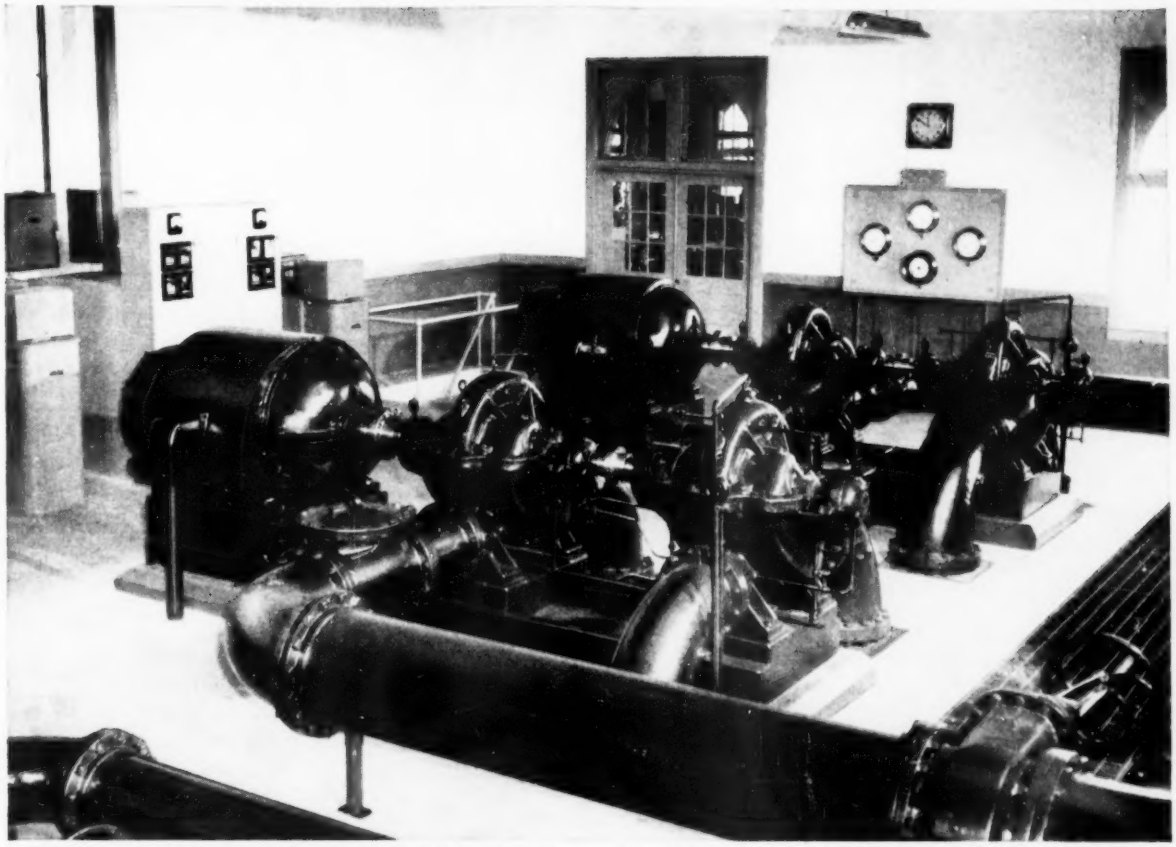


RECENTLY INSTALLED WORTHINGTON PUMPING UNITS at Columbia, S. C., Water Works. Each unit handles 10 million gallons per day at a 350-foot head. Other Worthington equipment at Columbia includes two 3½-million gallon per day duplex water-power driven pumps, two 18-million gallon per day electric-motor driven pumps, and one 5-million gallon per day series pump.

Columbia, S. C., uses 7 Worthington pumps

Two 10-mgd units newest addition in 46 years of Worthington pump operation

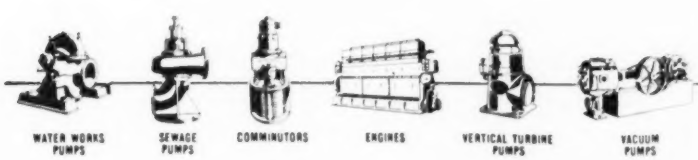
Columbia knows how Worthington equipment performs. The day-in, day-out dependable performance it has chalked up for 46 years is typical of the job Worthington pumping installations are doing everywhere.

It's pumping installations in average-size cities like Columbia, S. C., spread across the country from Maine to Florida, from New York to California, that have built up Worthington's reputation for the finest in water-works pumps.

Whether your city is large or small, Worthington can supply exactly the equipment for water-works pumping, sewage treatment or power generation. Remember, Worthington means *all* public works equipment under *one* responsibility.

Write us today, stating your municipality's requirements. We'll be glad to make recommendations at no obligation. Worthington Corporation, Public Works Division, Harrison, N. J.

W-2.2



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Check List for Proposed Water Supply Lines

24. A convenient folder covering all the requirements for proposed water supply lines has been prepared by Price Brothers Co., 1932 East Monument Ave., Dayton 1, Ohio. Basic questions about the materials you plan to use are arranged for easy evaluation of each type of pipe material. Get a copy of this useful folder by checking the coupon.

Heavy-Duty Pipe Cutter Works In or Out of Trench

164. Built to stand the most severe service, the all-purpose Ellis & Ford pipe cutter is easy to use in tight places, works in or out of trench. Full details on cutter and interchangeable parts in Catalog 25, available by checking coupon. Ellis & Ford Mfg. Co., Ferndale 20, Mich.

Self-Propelled Sidewalk Paver Lays Up to 10 Ft. per Minute

203. The Dotmar paver, which can lay up to 10 ft. per minute of sidewalk, may be converted readily to pave curb and gutter or integral curb, gutter and walk. Full details in 8-page Bulletin 52, released by Dotmar Industries, Inc., Kalamazoo, Mich. Just check the handy coupon.

RCA 2-Way Radio Increases Public Safety

204. Get full details on RCA 2-way radio systems for increased public safety and improved on-the-job communications with field crews of all municipal departments. All Public Works and Civil Defense planners should have this information. Use the coupon or write RCA Engineering Products, Camden, N. J.

How to Save On Automobile Insurance

208. Employees of the municipal, county, state and federal governments should investigate the savings on automobile insurance available to them through Government Employees Insurance Cos., Govt. Employees Insurance Bldg., Washington 5, D. C. Check the coupon for details.

Modern Convenience for Lead Melting and Soldering

196. Insto-Gas torches and furnaces give trouble-free service for lead melting, soldering and all other jobs where a steady, clean, hot flame is needed. Convenient cylinders require no regulating gauges and attach directly to standard furnace assembly. Full details from Insto-Gas Corp., Detroit 7, Mich., by checking the coupon.

A Handbook of Sewer Cleaning Methods and Materials

44. Complete, easy-to-follow directions for every type of sewer cleaning operation and the equipment needed for effective cleaning work is covered in a 40-page booklet issued by Flexible Sewer-Rod Equipment Co., 9059 Venice Blvd., Los Angeles 34, Calif. Full details are provided on power cleaning machines, the SewERodeR, hand tools and all accessories. Water main and culvert cleaning methods are included. Check the coupon for your copy of this helpful handbook.

Pre-Cast Filter Bottoms For Water Treatment Plants

217. Construction information on the Wheeler Filter Bottom, pre-cast type, for water treatment plants is offered by Builders-Providence, Inc., 345 Harris Ave., Providence 1, R. I. Illustrated Bulletin Sup. 700-K2 gives the details you need for planning and construction. Check the coupon for a copy.

Indicating, Recording and Totalizing Meter

218. For accurate measurement of water, gas, air, sewage, sludge, etc., the Simplex Valve & Meter Co., Philadelphia 42, Pa., has developed the Type H-Meter. This mercury flow type indicating, recording and totalizing unit operates in conjunction with Venturi tubes, flow nozzles and orifice plates. Full description of this meter and installation data in comprehensive Bulletin 401, available by checking the coupon.

Easy Operation Featured for This Heavy-Duty Tractor

47. The Oliver OC-18, with 126 drawbar horsepower, is designed with nine "easy operating" features which contribute greater output on the job. Application photographs, diagrams and sketches as well as complete specifications are included in an attractive folder. For a copy write The Oliver Corp., 400 W. Madison St., Chicago 6, Ill. or use the coupon.

The Millipore Filter—A New Tool For Water Works Labs

67. Bacteriological examinations of water and sewage are greatly facilitated by use of the new Millipore filter which retains all microorganisms during filtration and provides an improved method for culturing. Quantitative analyses for coliforms within 18 to 20 hours are claimed. Full data on this method, with colored illustrations of typical colonies, are presented in a booklet available from Lovell Chemical Co., Watertown 72, Mass. Check the coupon.

Modern Street Lighting Booklet by G. E.

75. A new two-color booklet describing General Electric's complete line of pendent type luminaires for modern street lighting has been made available. Information in this 32-page bulletin includes design, construction, performance and applications, as well as full photometric data. For a copy of this bulletin, GEC-936, check the coupon or write to General Electric, Schenectady 5, N. Y.

Lower Blasting Costs For Construction

76. A new booklet describes the advantages and properties of "Hercomite and Gelamite", explosives developed to fill the need for modern dynamites which reduce blasting costs and keep pace with other new methods in the construction field. Improved packaging developments are also described. Write to Hercules Powder Co., Wilmington, Del., or check the coupon for a copy of this booklet.

Use of Alum in Water and Sewage Treatment

111. The history, manufacture, properties and uses of aluminum sulfate, with special sections on the use of alum in the treatment of municipal and industrial water supplies and in sewage and industrial waste treatment, are presented in an interesting new booklet by American Cyanamid Co., Industrial Chemical Div., 30 Rockefeller Plaza, New York 20, N. Y. Copies are available by checking the coupon.

4-53

USE THIS COUPON to get detailed information on products and materials mentioned in this issue. Circle numbers below and mail today.

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292 293 295 296 297 299 304 312 315

New Products, pages 132 to 136:

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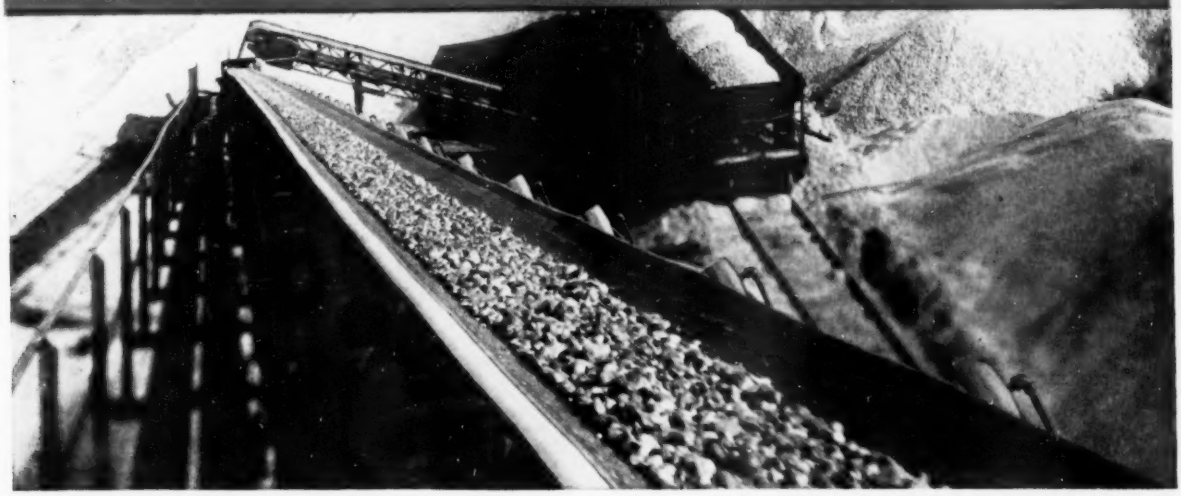

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NEW LISTINGS (Cont.)

Chemical Weed Killers Are Fast and Effective

117. Be sure to check Polybor-Chlorate and concentrated Borascu for fast, economical non-selective destruction of weeds and grasses. Features and applications of these effective products are outlined in bulletins available from Pacific Coast Borax Co., 630 Shatto Pl., Los Angeles 5, Calif. Check coupon for full data.

Mercury Vapor Lights Need Efficient Transformers

225. To get all the benefits of mercury vapor lamp illumination, efficient transformers are required. Complete data on Jefferson Transformers for all outdoor and indoor installations is offered in 16-page illustrated Bulletin 521-5 by Jefferson Electric Co., Bellwood, Ill. Particular attention is given to street lighting applications. Get a copy now by checking the coupon.

Save Excavating Costs By Boring for Pipe Installations

125. The Earthworm boring machine, a portable, compact unit for underground installation of pipe and conduit, is described in a bulletin available from Lube Jack Co., Box 1100, Santa Monica, Calif. Full operating instructions are included. Check the coupon for your copy.

End Manhole Rattle The Easy Way

184. It's easy to safeguard manholes and end annoying rattles by using Tapax, a wear-resisting, resilient manhole cushion available in convenient 100-ft. reels from Joseph G. Pollard Co., Inc., New Hyde Park, N. Y. Full details in Bulletin 14. Check the coupon.

Standby Power Ready When Needed

219. Powerful and compact Diesel generator sets for standby and auxiliary applications are offered in 100, 125 and 150 KW sizes by Detroit Diesel Engine Div., General Motors Corp., Detroit 28, Mich. Several models available to suit your needs. Get bulletins giving full data by checking the coupon.

Get Full Data On Aggregate Spreaders

231. Accurate control for spreading crushed rock, chips, sand or ice control materials is featured by all models of Highway Equipment Co. materials spreaders. Data on both trailer and tailboard types available by checking the coupon. Highway Equipment Co., 630 D. Ave., Cedar Rapids, Iowa.

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CIVIL DEFENSE

Warning Sirens Give Low Cost Coverage

242. Foster type 45 siren is easily recognizable, non-directional, not affected by cold. Powerful warning signal gives low cost per sq. mile coverage. Use coupon to get descriptive Bulletin 29. Foster Engineering Co., 835 Lehigh Ave., Union, N. J.

Check Your Power Needs Without Delay

68. International Harvester Company has available a folder describing its line of diesel engines and power units for all your power needs up to 180 hp. For a copy of this colorful booklet, write to International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill., and ask for Form A-156-NN, or use the handy coupon and we will forward your request.

Get the Facts on Air Raid Sirens

86. There's more to be considered in air raid warning sirens than the loudness of the signal. Get complete information on efficient size and spacing of sirens from Federal Enterprises, Inc., 8733 So. State St., Chicago, Ill., by using coupon.

Are You Ready Now To Make Main Repairs?

214. Broken water mains can quickly be repaired when you have "Skinner-Seal" Split Coupling Clamps on hand. Get Skinner Catalog 41 now—this handsome 40-page book shows how to make every type of pipe repair and covers a complete line of clamps to do the job quickly and easily. Just check the handy coupon for your copy. M. B. Skinner & Co., So. Bend 21, Ind.

Two-Way Radio Equipment For All Departments

293. The benefits of two-way radio communication in the uncongested non-interference 450-megacycle range make full information on this subject important to all engineers. Get full data on trouble-free systems from Motorola, Inc., Dept. PW, 4545 Augusta Blvd., Chicago 51, Ill. Just check the coupon.

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SIGNS AND TRAFFIC CONTROL

What's Your Traffic Problem?

127. Traffic signals and controllers of every type are offered by Eagle Signal Corp., Moline, Ill. You will find a great deal of helpful data and diagrams of typical installations in Bulletins A 10 and C 10, available by checking the coupon.

New Reflectorized Sign Faces Refurbish Old Traffic Signs

292. Get complete details on new "EZ-On" traffic signs faces ready for immediate shipments. Reflectorized faces cost only a fraction as much as new signs and are easily attached to existing traffic signs. Use the coupon for data today. Grace Sign & Mfg. Co., St. Louis 18, Mo.

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STREETS AND HIGHWAYS

Levels Sidewalks and Curbs Quickly and Easily

29. How the Mud-Jack Method for raising concrete curb, gutter, walks and streets solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities—a bulletin by Koehring Company, 3026 W. Concordia Ave., Milwaukee 16, Wis. Check the coupon.

Do You Have Complete Black Top Equipment Data?

41. In 36-page catalog AA a full line of maintenance is covered. Units described and illustrated include several models of pressure distributors, supply tanks, sprayers, brooms, asphalt kettles, portable rollers, and accessory tools. Use coupon for copy of this handy manual. Littleford Bros., 452 E. Pearl St., Cincinnati 2, Ohio.

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85. When the sides of patches and trenches are sawed before breaking, a saving of 25% in removal costs is claimed. And the smooth, straight edges won't spall or crack after replacement material is poured. Investigate the exclusive features that give maximum economy to Clipper concrete saws. Full information from Clipper Mfg. Co., 2823 S. Warwick, Kansas City 8, Mo., or check the handy coupon.

Reference Manual on Guardrail Design

114. Here is an interesting and informative booklet in which all factors influencing guardrail design are outlined, and safety and economy discussed in detail. Eight pages are devoted to basic design data, wih handy tables covering physical properties, tensile and beam strengths, deflection and other data. Write Armco Drainage and Metal Products, Inc., Dept. PW, Middletown, Ohio.

Get Data Now On This Catch Basin Cleaner

34. Simple powerful pneumatic bucket is featured by Netco Catch Basin Cleaner. Folder 33A gives details and illustrates operation of complete self powered truck mounted unit. Netco Div., Clark-Wilcox Co., 118 Western Ave., Boston 34, Mass.

How to Save Time on Curb and Gutter Work

143. Every type of curb and gutter work is illustrated in the 12-page Heltzel catalog on steel forms for building concrete curbs, gutters and sidewalks. Time-saving setups show how to speed up the job and save money. Get your copy from Heltzel Steel Form & Iron Co., Dept. PW, Warren, Ohio.

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150. The flexible Adnun Black Top Paver lays any asphalt mix, hot or cold, in widths from 6 ft. to 13 ft. Careful design lowers operating cost and cuts maintenance. Attachments spread stone, cinders or slag. Get full data on this machine by checking coupon. The Foote Co., 1954 State St., Nunda, N. Y.

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297. With the Barber-Greene Mixall you can get hot patch material wherever and whenever you need it for all maintenance jobs. Send for new 8-page bulletin that gives full information on this small, highly portable unit that turns out all types of bituminous patch material in any quantity you need. Write Barber-Greene Co., Aurora, Ill., or use the coupon.

Design Data on Universal Concrete Cribbing

274. Complete information on concrete cribbing for embankment retaining walls, bridge abutments, highway underpasses and other structures will be found in a new bulletin issued by the Universal Concrete Pipe Co., 297 S. High St., Columbus, Ohio. Check coupon for free copy.

Latest Data on Rubber Roads

296. A report covering all developments to date on the use of natural rubber in road surfacing of asphalt highways has been issued by the Natural Rubber Bureau, 1631 K St., N. W., Washington 6, D. C. Get your copy of this 52-page booklet which includes new data on research and full reports on test roads in many states. Use the handy coupon.

Aerial Surveys and Maps from Photographs

229. Written in non-technical language, a 16-page booklet with this title gives a complete explanation of aerial surveys for the municipal field. Interesting step-by-step pictures show how planimetric and topographic maps, mosaics and atlas sheets are produced by Abrams Aerial Survey Corp., Lansing 1, Mich. Check the coupon for your copy.

Hot or Cold Patching Mixtures Prepared on the Job

304. By preparing your patching mixtures, hot or cold, right on the job, you can use them immediately with a minimum of handling. Get full data on the McConnaughay Model HTD "Multi-Pug" Asphalt Mixer for fast, easy and economical preparation of patch materials. Write K. E. McConnaughay, Lafayette, Ind. or use the coupon.

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What You Should Know About Trickling Filter Underdrains

20. Specifications for vitrified clay underdrain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks, channel covers, angles and other fittings are available from the Trickling Filter Floor Institute, c/o Editor, Public Works, 310 E. 45th St., New York 17, N. Y. Check the coupon and we will forward your request.

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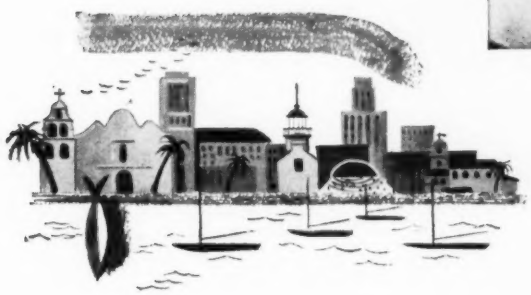

Fast growing San Diego uses over 45,000,000 gallons of water each day, most of it supplied from reservoirs strategically located in the Incopah Mountain Range in back of the city. Concrete pressure pipe delivers nearly all this water to San Diego.

And San Diego continues to specify concrete pressure pipe. One of the latest installations was the Sweetwater extension to the San Diego aqueduct. Here, over 23,000 feet of 18-inch and 24-inch pipe was used to improve the water supply system.

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Concrete PRESSURE Pipe

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Greenlee Bolt Hole Treaters
assure maximum life for poles, piles, timbers
Prevent decay around holes bored in new or old poles and timbers by pressure-treating each hole bored in the field. It's a simple operation with a GREENLEE Bolt Hole Treater. Treats the *entire* hole . . . forces preservative into all the wood cells around the bolt hole. Simply pour preservative in Treater cup until hole and cup are full. Pull back on handle, spring return does the work. Two models. Write for details. Greenlee Bros. & Co., 1744 23rd Ave., Rockford, Illinois.
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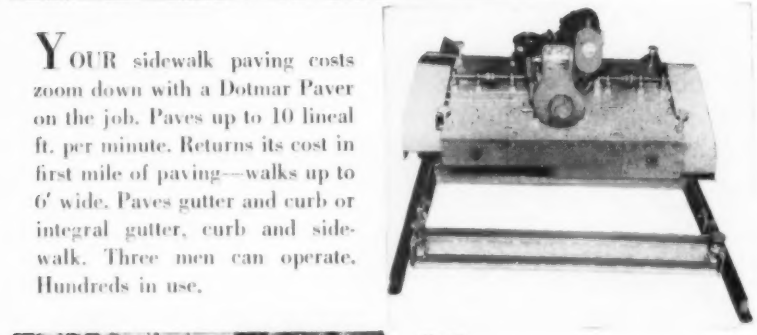
*CUT SIDEWALK PAVING COSTS TO THE BONE WITH A DOTMAR PAVER
YOUR sidewalk paving costs zoom down with a Dotmar Paver on the job. Paves up to 10 lineal ft. per minute. Returns its cost in first mile of paving—walks up to 6' wide. Paves gutter and curb or integral gutter, curb and sidewalk. Three men can operate. Hundreds in use.
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Valuable Booklet on Porous Diffuser Plates and Tubes

21. A helpful 20-page booklet published by the Norton Co. is a complete guide for the selection of porous media for installation in activated sludge plants. Full data for the designing engineer is provided by careful detailing of physical characteristics of plates and tubes. Maintenance of porous media also is discussed at some length. For your copy of Form 1246, write the Norton Co., Dept. PW, Worcester 6, Mass., or use the coupon.

How Cities Clean Sewer Lines From Street in One Operation

25. In a helpful 28-page handbook of sewer cleaning methods and equipment the makers of OK Champion sewer cleaners give full details of power and hand operated models. Also included are data on expansion buckets that take dirt from sewer to street in one operation, root cutters and other accessories. Get your copy by checking coupon. Champion Corp., 4752 Sheffield Ave., Hammond, Ind.

Water Level Controls for Sewage and Water Plants

31. Dependable float-operated pump and motorized valve controls for single or multiple pump installations are described in bulletins issued by the Water Level Controls Div., Healy-Ruff Co., 719 Hampden Ave., St. Paul 4, Minn. All units feature splash proof construction, mercury tube switches.

Make Your Own Concrete Pipe For Sewers and Culverts

65. Machinery for making concrete pipe for sewers and culverts, both plain and reinforced, sizes 4" to 36", is described in bulletins of the Concrete Pipe Machinery Co., Sioux City 17, Iowa. Either bell and spigot or tongue and groove can be made. Get full details by using the coupon.

Useful Data on Butterfly Valves

100. Complete descriptions and tables of dimensions on the full line of Rockwell Butterfly Valves is contained in several bulletins published by the company. Construction details and special control features are illustrated. Write W. S. Rockwell Co., 200 Eliot Street, Fairfield, Conn.

End Root Problems With Root-Proof Sewers

107. Troubles caused by roots and corrosions in house connections can be eliminated by the use of root-proof Bermico sewer pipe. Full details on this smooth, waterproof, tight-sealing pipe available by checking the coupon, or write to the Brown Co., Dept. PW, 150 Causeway St., Boston 14, Mass.

Designing Grit Chambers? Here's What You Should Know

113. A helpful bulletin filled with drawings of typical designs, operating data, clearly written text outlining the principles of grit chamber design and requirements for removal of grit free from organics is offered by the Dorr Company. Get your copy of Bulletin 6411 on the Dorr "Detritor" by checking the coupon or from the Dorr Co., Barry Pl., Stamford, Conn.

Technical Data Offered on The "Barminutor"

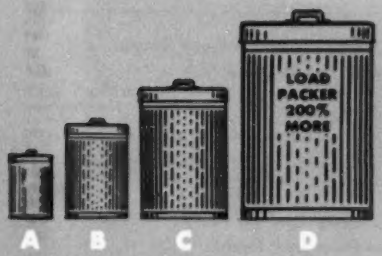
156. The Chicago Pump "Barminutor" which combines a bar screen with a vertically traveling Comminutor unit is now available for flows of 15 MGD and over. Units are readily installed in existing open channels. Get full technical data from the Chicago Pump Co., 622 Diversey Pkwy, Chicago 14, Ill.

Porous Media Handbook For Sanitary Engineers

222. A really helpful 56-page booklet just published by the Carborundum Company tells the complete story of the use of porous media in the fields of water and sewage treatment. The major portions are devoted to water filtration and air diffusion for activated sludge treatment. Diagrams show the many installation methods used, and full data is provided for the designing engineer. General data and specification sections complete this valuable reference bulletin. Get Form 5118 by checking coupon or write The Carborundum Co., Refractories Div., Perth Amboy, N. J.

ANOTHER GarWood ECONOMY FEATURE

SQUEEZE REFUSE COLLECTION BUDGETS WITH LOAD-PACKER'S DOUBLE COMPACTION



WHAT COMPACTION MEANS—

- **A** Closed body but no compaction.
- **B** Closed compaction body but no load retention.
- **C** Closed compaction body with average retention.
- **D** LOAD-PACKER body with maximum, double-acting compaction plus positive load retention.

Another big reason for Load-Packer's greater economy is the double compaction of hydraulic ram and automatic retaining panel. Twin, heavy-duty hydraulic cylinders exert up to 70,000 pounds of pressure on ram to compress refuse into a solid mass. Automatic, hydraulic retaining panel scrapes ram clean, helps ram compact, then retains compacted load under pressure in body. Double compaction of ram and retaining panel, plus positive retention under pressure, adds up to 200% extra capacity per cubic content of body.

Increased load capacity means fewer time-consuming trips to disposal point. Crew covers a larger area between disposal trips thus collecting more refuse per day. Crew idle time is minimized, collection schedules are speeded and expenditures for fuel, oil, tires and maintenance are substantially reduced.

You can step up your refuse collection schedules and reduce your operating costs by putting Gar Wood LOAD-PACKERS to work in your community. Mail the coupon below, NOW!

CHECK THESE EXTRA FEATURES:

- Larger-capacity tapered body
- Lower, wider loading hopper
- Fully-automatic finger-tip control
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- Improved hydraulic dumping

Gar Wood Industries, Inc.
36015 Main St., Wayne, Michigan 2L105
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Please send me facts about cutting refuse collection costs with the new, 1953 Gar Wood LOAD-PACKER.

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GAR WOOD INDUSTRIES, INC.

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TRUCK EQUIPMENT: Dump Truck Bodies and Hoists, Winches and Cranes, Refuse Collection Bodies, Elevating End-Gates. CONSTRUCTION EQUIPMENT: Excavators, Scrapers, Dozers, Ditchers, Spreaders, Finegraders, Truck-Mounted Road Graders.

To order these helpful booklets check the coupon on page 40.

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HELLIGE
Water Testing Equipment
USED WITH CONFIDENCE ... EVERYWHERE

COLORIMETRIC COMPARATORS
Employing
GUARANTEED NON-FADING
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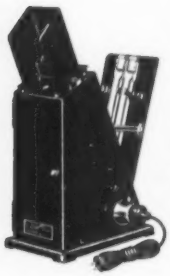

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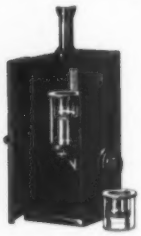

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877 STEWART AVENUE, GARDEN CITY, N.Y.

Helpful Data on Sluice Gates

158. In a well-organized 48-page catalog you will find complete engineering and design data on Pekrul sluice gates, headgates, automatic flap gates, lifts and accessories. Numerous models in 6" to 92" sizes are available, and all pertinent data will be found in this helpful booklet. Write Morse Bros. Machinery Co., Denver, Colo., or use the coupon.

Non-Clogging Vertical Wet-Pit Pump Described

182. Full engineering data on Worthington "Freeflo" wet-pit pumps with non-clogging impellers capable of passing solids and stringy material are included in Bulletin W-317-B12. Check these pumps for sump, sewage and drainage service. Bulletin available from Worthington Corp., Harrison, N. J. Just use the coupon.

Efficient Blowers for Activated Sludge Plants

232. Many advantages of Roots-Connersville positive displacement rotary blowers are described in Bulletin 22-23-B-13, which also provides characteristic curves for operation with constant speed, multi-speed and variable speed motors and details of several types of blowers. Get this helpful bulletin by checking the coupon. Roots-Connersville Blower Corp., Connersville, Ind.

Book Tells How to Control Root Stoppages

249. Details on the proven use of copper sulfate to control root and fungous growths in sewers are contained in a brand-new book published by Phelps Dodge Refining Co., 40 Wall St., New York 5, N. Y.

Reference Book on Lubricated Plug Valves

273. Lubricated plug valves, including stick-proof lever sealed valves for easy operation and positive mechanical seal are fully described in reference books issued by Homestead Valve Mfg. Co., Box 550, Coraopolis, Pa. Check the coupon for your copy.

Heating, Thawing and Melting With Hauck Burner Equipment

277. A helpful 16-page bulletin covers the complete line of Hauck heating and melting equipment. Data covers units for every water, sewer and street department purpose, from "one-man" burners to large size portable kettles. For a useful addition to your reference file, get Bulletin 1068 from Hauck Mfg. Co., 117-127 Tenth St., Brooklyn 15, N. Y.

How to Dispose of Sewage and Industrial Sludges

281. Get full information on the C. E. Raymond System of combined incineration and sludge drying providing high temperature deodorizing for nuisance-free sludge disposal. Flexible layouts fit large and small communities. Use handy coupon or write Combustion Engineering-Superheater Inc., Flash Dryer Div., 200 Madison Ave., New York 16, N. Y.

BUSINESS AND ADMINISTRATION

10 Reasons for Blanket Bond Covering Public Employees

289. As a part of their modern bonding program the National Surety Co. presents 10 reasons for having a Public Employees' Blanket Bond covering your personnel in forms offering greatest protection per premium dollar. Get Form 23163 by checking the coupon. National Surety Corp., 4 Albany St., New York, N. Y.

POWER AND LIGHT

Low Cost Power From Dual Fuel Engines

154. Operating on the Diesel cycle, burning either oil or gas, the Worthington Supercharged Dual Fuel Diesels give high economies by running on the cheapest fuel available. Get complete data from Worthington Corp., Dept. PW, Harrison, N. J.

CONSTRUCTION EQUIPMENT AND MATERIALS

1,001 Profitable Uses For Holmes-Owen Loader

39. The addition of a Holmes-Owen Loader to your dump truck converts it into a complete digging and loading unit that enables one man to load, haul and dump. Illustrated folder shows how this self-loading unit with hydraulic crowding action can be a real time and labor saver for the municipality or contractor. Check the handy coupon for full data. Ernest Holmes Co., Chattanooga, Tenn.

Handbook of Contractors Pumps Is Easy to Use

49. Big 50-page Catalog P-10 covers dewatering pumps, pressure pumps, well point systems and electric pumps, and also features a special section of useful data which helps in the selection of the right pump for your job. Every construction engineer and contractor should have a copy of this valuable handbook. Just check the coupon. The Jaeger Machine Co., 400 Dublin Ave., Columbus 16, Ohio.

Blades For All Types Of Equipment

60. Get information now on long-wearing blades for graders, scrapers, bulldozers, snow plows and scoops; snow plow noses and runners; scarifier teeth and numerous other products for road machinery. Check coupon or write to Paper-Calmenson & Co., St Paul 8, Minn.

The Manufacturers' literature described on these pages is costly, so order just what you need. Use the handy mailing card or coupon today.

A "Quick-Way" Truck Shovel Will Handle Your Job

82. Four models of "Quick-Way" truck shovels, ¾ to 1½ yd. capacity, and trench hoe, backfiller, crane, shovel, clamshell, pile driver or dragline attachments are ready to handle most every type of public works project. Get complete details by checking the coupon or write to "Quick-Way" Truck Shovel Co., Box 1800, Denver 1, Colo.

Grading Can Be Faster, Cheaper and Easier

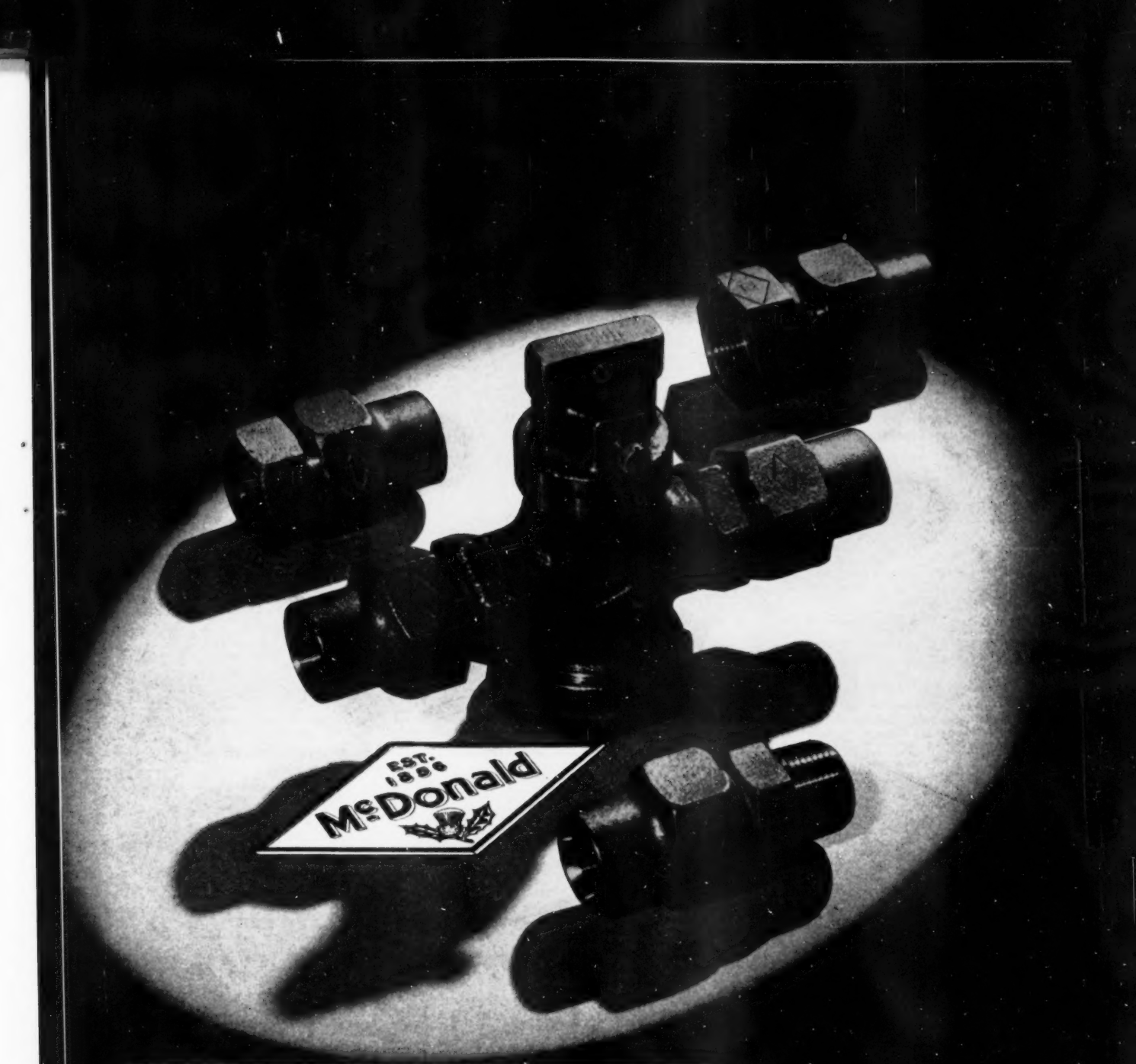
96. You'll like every feature of the Austin-Western 99II Grader. It has all-wheel drive, all-wheel steer, controlled traction, precision sideshift and a high lift, extreme reach, reversible blade. Get data from Austin-Western Co., Aurora, Ill.

Booklet Helps Design of Custom-Engineered Steel Buildings

110. Custom-engineered Butler steel buildings are available in every size, type and design to meet your building needs. In a helpful 32-page booklet you will find details on several basic designs and an unlimited variety of door, window and interior treatments; answers to your questions on construction and erection; and many illustrations of typical uses. Use the coupon or write to Butler Mfg. Co., Kansas City, Mo.

Profitable Construction with Payloader

234. A comprehensive, 12-page catalog filled with on-the-job photos showing a wide variety of earth-moving, material-handling, lifting and carrying jobs being performed by the multi-purpose tractor-shovels known as "Payloaders" is now available. Helpful job data, specifications and features of the complete Payloader line are included, with illustrations of useful accessories. Copies of this colorful catalog No. 217 can be obtained from The Frank G. Hough Co., 761 Sunnyside Ave., Libertyville, Ill., or by checking the coupon.



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An illustrated brochure with detailed specifications showing our complete line of Waterworks Brass will be sent to you promptly on request. A. Y. McDONALD MFG. CO., Dubuque, Iowa.

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To order these helpful booklets check the coupon on page 40.

Helpful Booklet on Carryable Centrifugal Pumps

129. A booklet prepared to give practical information that will guide you in choosing the best type of pump for your requirements is offered by the Homelite Corp. Both gasoline and electric models are discussed, and requirements outlined for many applications. Just check the coupon for your copy. The Homelite Corp., 2125 Riverdale Ave., Port Chester, N. Y.

Drill Concrete Faster and Easier

146. Your rotary electric or air drill, used with RCD drill bits, will drill precision holes even in reinforced concrete. Bits available in ¼" to 4" sizes and larger. Get illustrated bulletin and price list from Rotary Concrete Drill Co., 650 S. Arroyo Pkwy., Pasadena 1, Calif. Just use the coupon.

Versatile Maintainer Has Year 'Round Usefulness

151. The sturdy Huber Maintainer will work for you the year 'round on mainteance jobs, berm leveling, road planning, bull-dozing, snow plowing, brooming, mowing shoulders and as a patch roller. Good ideas on how to do all these jobs in Bulletin No. M-138. Write Huber Manufacturing Co., Dept. PW, Marion, Ohio.

Handbook of Castings For All Public Works Construction

220. Every type of construction casting needed by engineers and contractors in the public works field will be found in a 136-page catalog issued by Neenah Foundry Co., Neenah, Wis. Detailed illustrations and complete tables of dimensions will help the designer and materials buyer. Get your copy of this valuable catalog by checking the coupon today.

Get Tough Blades and Cutting Edges For Your Construction Equipment

221. Controlled analysis steels used in Shunk blades and cutting edges for graders, scrapers, dozers, and snow plows mean long life and wear resistance to give you more value for your maintenance dollar. Full data for ordering blades and scarifier teeth for standard and special equipment is available from Shunk Mfg. Co., Bucyrus, Ohio. Check the coupon today.

Have You Investigated Aluminum Gratings?

200. Aluminum gratings for walkways, bridge decking, and stair treads save weight, resist corrosion and are easily handled. Get complete design data, including safe load tables, standard panel widths and weights, from Irving Subway Grating Co., 50-53 27th St., Long Island City 1, N. Y. Just check the handy coupon.

How Air Placement of Concrete Will Help on Your Jobs

215. There are hundreds of jobs that can be done easier and cheaper by air placement of concrete; reservoir, tank and pool linings, concrete maintenance of all sorts are just a few of the applications. Get full details on two models of the high speed, easily operated "Bond actor" from Air Placement Equipment Co. 1009 West 24th St., Kansas City 8, Mo. Check the coupon.

Give Full Protection To Treated Poles and Timbers

267. Bolt holes in treated poles and timbers used for guard rails and structures can easily be the first point of decay. Now you can assure maximum life by using the Greenlee Bolt Hole Treater, a simple device that forces preservative into the wood cells. Bulletin 13-15 gives the details. Greenlee Bros. & Co., Rockford, Ill.

Drill Concrete With Your Ordinary Electric Drill

295. Substantial cost-per-hole savings are claimed for Tilden Rotary Drills which penetrate 2" to 4" per minute. Available in sizes ¼" to 4". Cutters can be resharpened. Full data from Tilden Tool Co., 209 Los Molinos, San Clemente, Calif. Just check the coupon.

Details on Motor Grader Construction and Use

312. In a handsome catalog, profusely illustrated with diagrams and photographs of unusually fine quality, the Galion Iron Works and Mfg. Co., Galion, Ohio, has presented all details on the construction and operating features of their Model 118 motor grader. This impressive 28-page catalog, No. 375, is available without charge. Just check the coupon

Not Sure You Need A Hydrocrane? Just See What One Can Do!

185. In one of the most appealing bulletins we have seen there are over 100 illustrations showing the versatile, all-hydraulic Hydrocrane performing dozens of different jobs. You could keep one busy with digging, trenching, backfilling, cleaning catch basins, loading and unloading, hoisting and erecting, materials handling, placing pipe, and on many other applications. For the full story of this mobile, truck-mounted machine just check the coupon today. Bucyrus-Erie Co., South Milwaukee, Wis.

●

REFUSE COLLECTION AND DISPOSAL

Sanitary Landfill Operation and Methods

28. The location and area requirements for sanitary landfill, operation methods for trench type and area fills, equipment selection and costs are items discussed in an 8-page booklet issued by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Be sure you have this reference when considering the problem of garbage and refuse disposal. Check the handy coupon today.

Increasing the Efficiency of Bulk Rubbish Collection

177. Strategically spotted bulk containers can be handled by one man operating a Dempster-Dumpster equipped truck. Get full details of this cost-saving system of rubbish collection, as used by many cities to increase efficiency and eliminate unsanitary conditions. Write Dempster Brothers, Inc., 952 Dempster Bldg., Knoxville 17, Tenn., or use the handy coupon.

Thinking of Sanitary Landfills? Get This Booklet Now

131. One of the most informative descriptions of the sanitary landfill method of garbage and refuse disposal is presented in Caterpillar's

More Jobs Per Day by FAST TRAILING - - - Littleford MODEL 157 TRAIL-O-ROLLER

This Highly Portable Roller is a modern workhorse when it comes to rolling. Now Contractors, Highway Departments, Park Departments and Cities can transport this 2 to 3 ton Roller to job after job in a single day. The 157 Trail-O-Roller has a Hydraulic Lift supplying power to change from rolling to trailing or trailing to rolling position and it takes one man less than five minutes to make the change. Model 157 is sturdy, easy to handle, compact and has plenty of power. This highly portable 157 Trail-O-Roller gives compaction from 75 to 160 lbs. by adding ballast to the front and rear roll. Model 157 will roll Highways, Streets, Roads, Runways, Parking Lots, Driveways, or wherever compaction is needed. Cost-saving features make this 157 Roller the most modern unit of its kind. Write for Bulletin No. 24.

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Model 125:—First compressor to run 2 heavy duty breakers or one heavy rock drill efficiently.

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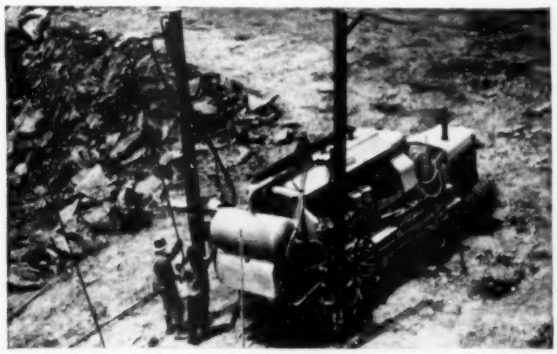

Model 600:—First to run 2 heavy wagon drills or a big 9B3 pile hammer efficiently. First "new standard" copied by the industry.

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16-page booklet "A Look to the Future with Sanitary Landfill." The booklet is designed to serve as a guide to proper site selections, the choice of the right equipment to do the job, and the actual operations of sanitary fill. Pictorial treatment shows how and when to start such a program, what to look for in a site, benefits received by the community, and other important considerations. Published by the Caterpillar Tractor Co., Peoria 8, Ill. Check the coupon for your copy.

How to Reduce Refuse Collection Costs

123. The sequence of operations for fast loading and refuse compaction in the Gar Wood Load-Packer are illustrated and described in 12-page folder W-110, together with size data and details of hydraulic elements. Be sure to check all details of the efficient Load-Packer system. Check coupon or write Gar Wood Industries, Wayne Division, Wayne, Mich.

WEED CONTROL

Operations Manual Tells Brush and Weed Control Techniques

50. Data on methods and results in chemical brush and weed control are outlined in an operations manual compiled by the Du Pont Company. Included are cost data and evaluations of short-term vs. long-range control programs. Copies of this illustrated manual may be obtained from Grasselli Chemicals Dept., E. I. Du Pont de Nemours & Co., Inc., Wilmington, Del., or by using coupon.

What You Should Know About Chemical Weed Control

132. In a convenient 44-page book, the C. B. Dolge Co. gives full details on spraying procedures and chemicals to use for control of lawn and roadside weeds, ragweed eradication and insect control in turf. Get your copy by checking the coupon or write C. B. Dolge Co., Westport, Conn.

WATER WORKS

Head Loss Data On Plastic Pipe

26. Carlon Products Corp., 10225 Meech Ave., Cleveland 5, Ohio, announces that authoritative data has been compiled on head loss due to friction in Carlon plastic pipe and is available in the form of graphs and charts. The graphs show superior flow characteristics, attributed to the fact that plastic pipe is not "wetted" by water. Send for this data today by using the handy coupon.

Painting Water Tanks For Longer Protection

52. High labor costs demand special consideration when painting elevated water tanks. This and other factors involved in proper paint selection are discussed in a bulletin issued by Jos. Dixon Crucible Co., Jersey City 3, N. J. Helpful specifications for repainting water tanks are also included. Check the coupon today.

Bulletin Helps Specify A.W.W.A. Valves

64. All the facts you need to know when designing, ordering or specifying A.W.W.A valves will be found in Bulletin 106, issued by Kennedy Valve Mfg. Co., Elmira, N. Y. Detailed specifications are provided on the wide range of types, sizes, controls, accessories and connections available. Check the coupon to get this valuable reference material for your permanent file.

To Restore Capacity Of Water Lines

78. Water pipe cleaning service by hydraulic methods, power driven cleaners for scale and encrustation removal, plus relining of water mains are services offered by Ace Pipe Cleaning Contractors, Inc., 2003 Indiana Ave., Kansas City, Mo. For full description of these and other pipe cleaning services get the illustrated Ace catalog. Just check the coupon.

Technical Data on Fluorides And Other Chemicals

48. Technical data on fluorides and other chemicals will be found in a comprehensive booklet issued by Blockson Chemical Co., Joliet, Ill. This helpful 60-page booklet includes a great deal of general information of value to water works men. Get a copy by checking the coupon.

Efficient Coagulation With Ferri-Floc

69. Advantages claimed for Ferri-Floc as a coagulant include wide pH range, quick floc formation, manganese removal, control of certain tastes and odors, plus other aids in high quality water production. Check coupon for complete Ferri-Floc data. Tennessee Corp., Grant Bldg., Atlanta, Ga.

Floatless Liquid Level Controls

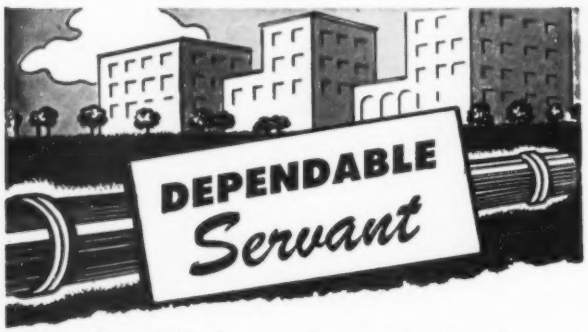
92. Complete descriptions of electrode type floatless liquid level control systems, including control units, electrodes and fittings, panel assemblies and diagrams of typical installations for all types of municipal service are covered in the 32-page catalog of Charles F. Warrick Co., 1956 W. Eleven Mile Rd., Berkley, Mich. Check coupon for your copy.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa.

How to Tap Concrete Pressure Pipe

126. The simple steps required in making a pressure tap in concrete pressure pipe are explained in a booklet issued by Lock Joint Pipe Company. Be sure you know how either large connections or small service outlets may be made economically and without sacrifice of strength. Just check the handy coupon. Lock Joint Pipe Co., Box 269, East Orange, N. J.



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Easily mounted on any short wheel base truck with 8 ft. in back of the cab, the Netco can be operated continuously, averaging 20 to 30 catch basins a day. The Netco with its two powerful pneumatic buckets (orange peel or clamshell) is simple to operate, has a hoisting capacity up to 1500 lbs., and easily removes all debris through openings as small as 16 inches.

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CLARK-WILCOX COMPANY
118 Western Avenue
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SINCE 1907

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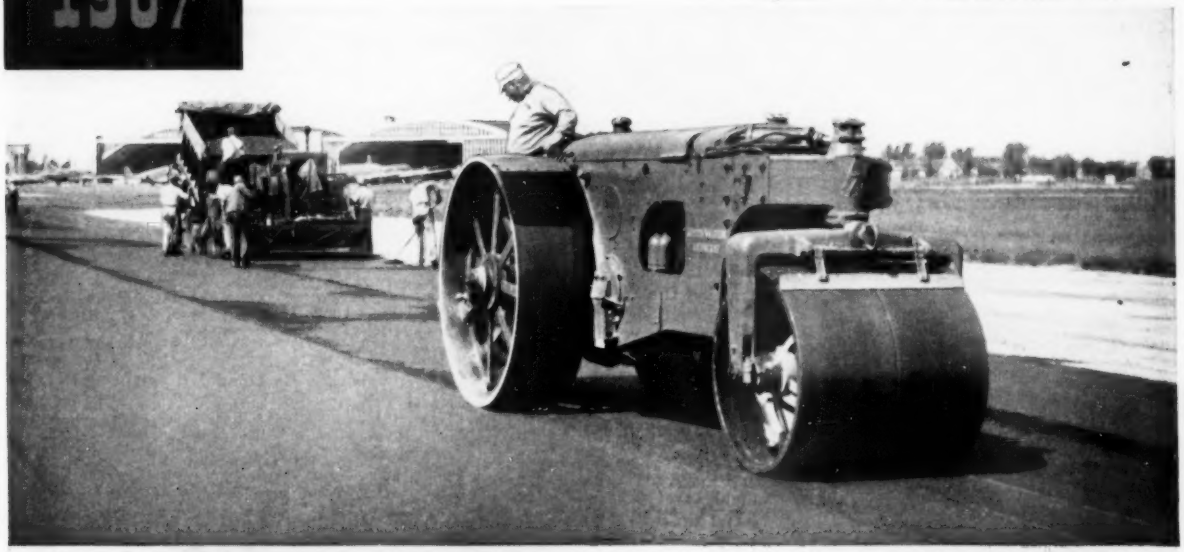

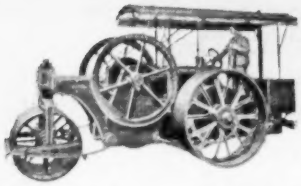

They said it of the "one-lunger" of 1907, and they say it today . . . "Austin-Western rollers stay on the job day after day, and month after month, with less time lost for mechanical adjustments, maintenance and repair." That's DEPENDABILITY! Add to it the precision job of rolling that results from such things as Proper Weight Distribution, Vibrationless Power Units and Smooth Acting Clutches, and you have everything needed for top grade performance. The Autocrat is made in 10- and 12-ton sizes. Each has full-length side plates for maximum rigidity; low center of gravity for smooth operation, and hydraulic power steer. Each may be had with gas or diesel engine. Special equipment includes lights, sprinkling system, canopy top and powerful hydraulic scarifier.

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Get full details of this month's new products . . . mail your Readers' Service card today.

To order these helpful booklets check the coupon on page 40.

Faster Pipe Laying With Precaulked and Threaded Joints

148. McWane 2" cast iron water pipe with threaded joints and precaulked bell and spigot pipe are described in folder WM-47. Additional data on 3" to 12" centrifugally cast pipe and fittings in folder WL-47, both issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala.

Helpful Data on Corporation Stops

161. A complete line of brass goods for water works: corporation stops, curb stops, service pipe couplings, goosenecks and other fittings are illustrated and described in catalog W-39, issued by A. Y. McDonald Mfg. Co., Dubuque, Iowa. Get your copy for ready reference.

Inserting Valves Without Shutdown

162. Do you have the latest data on equipment for inserting control valves where shutdown is impractical? Mueller catalogs H-20 and H-602 give all details on inserting valves and equipment, using hand-operated or power-operated machines. Get these catalogs today by checking the coupon. Mueller Co., Decatur, Ill.

Engineering Data On Mechanical Joint C.I. Pipe

183. General specification, weights and dimensions of mechanical joint cast iron pipe and fittings are furnished in a 32-page booklet issued by Alabama Pipe Co., Anniston, Ala. Get this helpful data by checking coupon.

Locate Mains and Services Without Digging

186. A 16-page booklet tells how to use the Fisher "M-Scope" to locate buried pipes and valves by electronic means. Proper manipulation also determines depth of cover. Battery operated unit is readily carried by one man. Get data from Fisher Research Laboratory, Inc., 1961 University Ave., Palo Alto, Calif.

Tested Jointing Materials

102. "Hydrotite" is a self-caulking, self-sealing joint compound for bell and spigot pipes. For data book and sample write Hydraulic Development Corp., 50 Church St., New York, N. Y.

Specs for Gate Valves

112. Rigidly inspected gate valves for pressures up to 175 lbs. by R. D. Wood Co. Sizes 2" to 30"; for any standard type joint. R. D. Wood Co., Public Ledger Bldg., Philadelphia 5, Pa.

Pipe Joint Essentials and Couplings for Every Job

168. Superior pipe joints are tight, flexible, simple, strong and economical. Dresser's handsome 34-page bulletin No. 513 shows how these essentials are met and provides layouts for curves, working pressures and a wealth of other data. Be sure to check this bulletin on the coupon. Dresser Mfg. Div., 59 Fisher Ave., Bradford, Pa.

Complete Catalog on Plumbing Drainage Products

169. Josam Catalog "K", said to be the most complete ever offered on plumbing drainage products, includes floor drains, roof drains, interceptors, sewer backwater valves, swimming pool fittings and many other specialties. Careful arrangement helps the designer find just what he wants. Your copy is waiting. Just check the coupon or write Josam Mfg. Co., Dept. X35, Michigan City, Ind.

All-Electric Floatless Liquid Level Control

174. Description of operating principles and application of B/W controls show the simplicity and many uses of these all-electric, floatless devices. Get latest bulletin for engineering data, diagrams of typical installations and details of component parts. Check the coupon or write B/W Controller Corp., Dept. PW, Birmingham, Mich.

Avoid Needless Digging With This Valve Box Locator

178. Convenience and accuracy are keynotes of the Aqua Valve Box Locator described in a full color folder by Aqua Survey and Instrument Co., 2518 Leslie Ave., Cincinnati 12, Ohio. Cobalt alloy steel dipping needle is factory-set for any geographic location. Get full details by checking the coupon.

How to Design Chemical Feed Systems

179. In a 12-page booklet published by Proportioneers, the many factors which enter into the design of a chemical feed system are discussed, and the types of systems used described in detail. These include dry feed, both volumetric and gravimetric and solution feed of the decanter and positive displacement pump types. Feeder controls are considered in detail. Send now for File No. RP-9080 by checking coupon. Proportioneers, Inc., Providence 1, R. I.

Efficient Underdrains for Rapid Sand Filters

239. Be sure you have engineering data on vitrified clay underdrains, efficiently designed for filtering and backwashing. Check the coupon or write F. B. Leopold Co., Inc., Dept. PW, 2413 W. Carlson St., Pittsburgh 4, Pa.

Locate Pipes and Fittings Accurately

257. Save time and money with the precision Pathfinder detector for locating pipes, tees and valves. Powerful detecting unit tells you where to dig. For full details check coupon or write Pathfinder Co., 1726 Beverly Dr., Pasadena 7, Calif.

All About Centrifugal Pumps

258. Where pumping performance counts you want to check your specifications carefully. Investigate the features of Fairbanks-Morse centrifugals. Use coupon or write to Fairbanks, Morse & Co., Dept. PW, Chicago 5, Ill.

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Twin rigs take debris from sewer to street in one operation.

Mounted on four wheel trucks—safer—eliminates lifting over or pulling away from manholes—safer tandem towing.

All Controls at Working End—keeps operator out of passing traffic—allows full vision of work.

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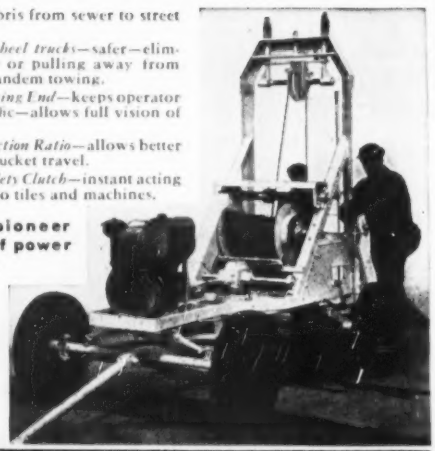
Fully Automatic Safety Clutch—instant acting—avoids damage to tiles and machines.



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Please send information on new OK Champion Power Sewer Cleaners.

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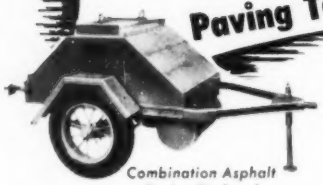

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Heat 16 or More Tools in 5 Minutes

Hauck Heaters get your asphalt tools ready as you need them. Burn kerosene; can also be furnished to burn L.P. gas. No sparks, no smoke, no ashes. Only safe, controlled heat. Available with built-in binder cement kettle or with rack for binder pails.

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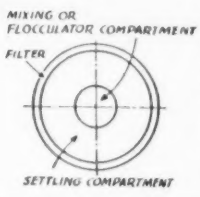
Information courtesy Mr. E. H. Aldrich, Chief Engineer, American Water Works Service Co., Phila., Pa.



There are four purification units like this at Chattanooga with a rated capacity of 2.5 mgd each, capable of operating at twice this capacity. These are an addition to the existing plant of 32 mgd capacity.

Two years ago, this entirely new design developed by American Water Works Service Company was installed in Alexandria, Va. Instead of the conventional layout, with separate structures for mixing, settling, etc., this plant has "*purification units.*" Each unit incorporates all the major purification operations . . . i.e. after the raw water is chemically treated, it receives the usual mixing, coagulating, settling, and filtering, all in the same steel tank (see drawing).

The success of the plant has led to two new installations—Chattanooga, Tenn., and Westmoreland County, Pa. Like Alexandria, both these plants cost far less to build than comparable units of conventional design. All three plants have proved to be easy and economical to operate, and highly flexible.

The porous underdrains used in all these purification units are ALOXITE aluminum oxide plates. These should contribute materially to continued low operating and maintenance costs.

May we send you our popular booklet on porous media? It's 56 pages cover all fields of filtration and diffusion. It gives pointers on specifying materials; outlines how to install, operate and maintain various units. Complete with photos, charts, etc.

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To order these helpful booklets check the coupon on page 40.

Emergency Chlorination and Main Sterilization

213. Get data on portable emergency chlorination units designed to save time in cases of broken mains or substitute water supplies. Use coupon to order copies of publications 22-C, 58-C, and 408 from Wallace & Tiernan Co., Newark 1, N. J.

Does Your Water Works Have Standby Power?

224. Dependable Climax power plants are ready for emergency service to insure fire protection, and can also save power costs by peak load operation. Use the coupon for full data on Climax, 40 to 495 HP, operating on sewage or natural gas, butane or gasoline. Climax Engine & Pump Mfg. Co., 208 So. La Salle St., Chicago 3, Ill.

Investigate This Compact Flow Meter for Water

226. The Foster "Flow Tube" is a metering element that is compact and easy to install. Bulletin FT illustrates simple element containing nozzles for differential pressure production and shows capacity range and accuracy. Made in standard type sizes. Foster Engineering Co., Union, N. J. will send copy, or use coupon.

Helpful Valve Catalog For Engineers

236. For complete descriptions of Darling double disc, parallel seat gate valves be sure to get Bulletin 5002 issued by Darling Valve & Mfg. Co., Williamsport, Pa. Construction details covering all valve parts and accessories are helpful for specification writers. Check the coupon for your copy.

Standard Specifications for C. I. Pipe and Fittings

278. Standard dimensions for cast iron water pipe and special castings are available in a convenient booklet offered with the compliments of U. S. Pipe and Foundry Co., Burlington, N. J. Get your copy by checking the coupon.

Complete Catalog and Reference Data on Valves and Fittings

211. The entire M & H line of valves, fittings and accessories for water works, filtration, sewage disposal and fire protection are illustrated and fully detailed in Catalog 52 issued by M & H Valve & Fittings Co, Anniston, Ala. In addition to complete data on these products, there are many pages devoted to helpful engineering data. Every designer should have a copy. Get yours by checking the coupon

Design Data on the Circuline Sludge Collector

237. All the information you need for the design of circular settling tanks using the Link-Belt Circuline sludge collector will be found in 20-page Book No. 1982, published by Link-Belt Co., P.O. Box 472, Lansdale, Pa. Capacity tables, suggested sizes for all piping and design details are included. Check the coupon for your copy of this valuable booklet

For prompt catalog service always use the PUBLIC WORKS reply card or coupon.

Corrosion Protection For Water Works

280. Steel pipe lines, elevated tanks, treatment plant equipment and all other steel structures subject to rust, tuberculation and attack by aggressive soils can be protected by long-lasting Bitumastic enamels. Send for bulletins today so that you can specify the right coating for your job. Use coupon or write Koppers Co., Tar Products Div., Pittsburgh 19, Pa.

What You Should Know About The Centriline Process

197. The Centriline method for lining mains in place to stop leaks, prevent corrosion and increase carrying capacity is fully described in a handsome booklet issued by the Centriline Corp., 140 Cedar St., New York 6, N. Y. Many illustrations and typical case histories show the operation and economies of this process. The Tate process for lining smaller mains is also covered. Check coupon for your copy.

New "Chromatron" Photoelectric Colorimeter and Turbidimeter

251. The Hellige "Chromatron" features selective color filters, square and round absorption tubes, hermetically sealed photocell and automatically focused bulb to permit analysis of water and sewage using Standard Methods or any other colorimetric procedure. Full information from Hellige, Inc., 877 Stewart Ave., Garden City, N. Y.

Helpful Data On Valve Boxes

291. Bulletin 35 issued by Buffalo Pipe & Foundry Co., Box 55, Sta. B., Buffalo, N. Y. gives full details on adjustable valve boxes, extension boxes and roadway boxes for water and gas. Get your copy by checking the coupon.

Factors to Consider in Elevated Tank Selection

299. Details on the several different types of elevated steel tanks, including capacity ranges, tank dimensions and other factors to be considered in the selection of elevated tanks for modern water storage, plus discussions of new tanks for old towers and foundations are included in Bulletin 101 of the Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa. Check coupon for your copy.

Trencher Fits Municipal Needs

315. A bulletin describing the Cleveland Model 95 trencher has been published by the Cleveland Trencher Co., Cleveland 17, Ohio. The Model 95, called "The standard machine for city and suburban work", is versatile, manueverable and economical for use on water lines, service lines, road widening and all utilities trenching. Get this 8-page illustrated bulletin by checking the coupon.

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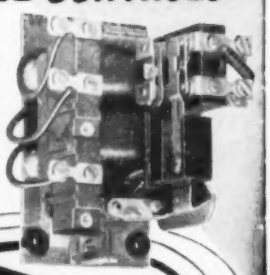

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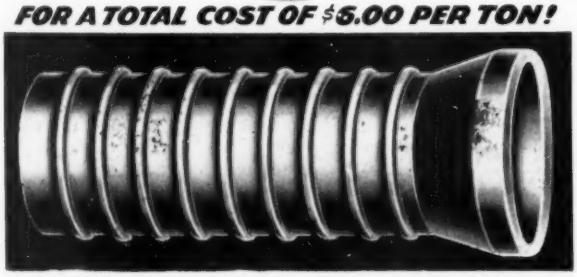
Make this pipe in 30 seconds

FOR A TOTAL COST OF $6.00 PER TON!



McCracken Machines make 4" to 36" concrete pipe, plain or steel reinforced, with both tongue and groove or bell and spigot joints. For use in farm drainage, road culvert, and sewer (both storm and sanitary) systems.
McCracken's unmatched production speed, quality of pipe, and economy of operation gives you the big edge over competition and means bigger profits on every job. Write for complete details, to Dept. P W J at any of the following addresses:

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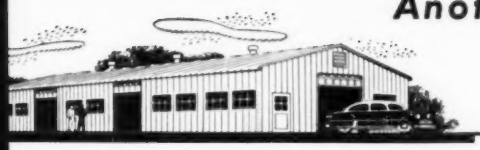
CONCRETE PIPE MACHINERY CO.
SIOUX CITY, IOWA

Geo. N. Hoffman: Apartado Postal 1173, Mexico D. F.



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Locks sheets to rigid steel frame

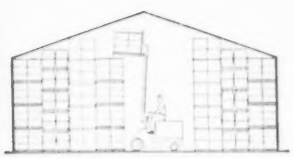
Typhoons and earthquakes have proved the superior protection given to building contents by Butler construction! Galvanized bolts lock specially-corrugated Butler galvanized or aluminum sheets to rigid steel framework. Sheet laps are bolted together for extra rigidity and weather-tightness. Precision-punched and dimensioned bolt holes assure fast, easy, low-cost field erection—and also assure 100 percent re-use of materials for building expansion or removal to a new location.

Extra protection against wind, rain and snow is provided by steel-backed Neoprene rubber washers.

Only BUTLER *gives you ALL these advantages:*

- Clear span, rigid frame construction
- Deep-drawn corrugated sheets, galvanized or aluminum
- Bolted construction
- Die-formed one-piece roof ridge
- Weather-sealed windows and base
- Die-formed curved eave sheets
- Sidewall sheets mitred for weathertight fit with eave sheets
- Weathertight stationary ventilators
- Easily insulated
- Complete adaptability to your door and window requirements

This combination rigid frame Butler building is used as an insulation processing plant. Butler single span rigid frame buildings are available in widths to 70 feet; combination or multiple units in practically any desired width; with heights and lengths to meet the widest range of requirements.



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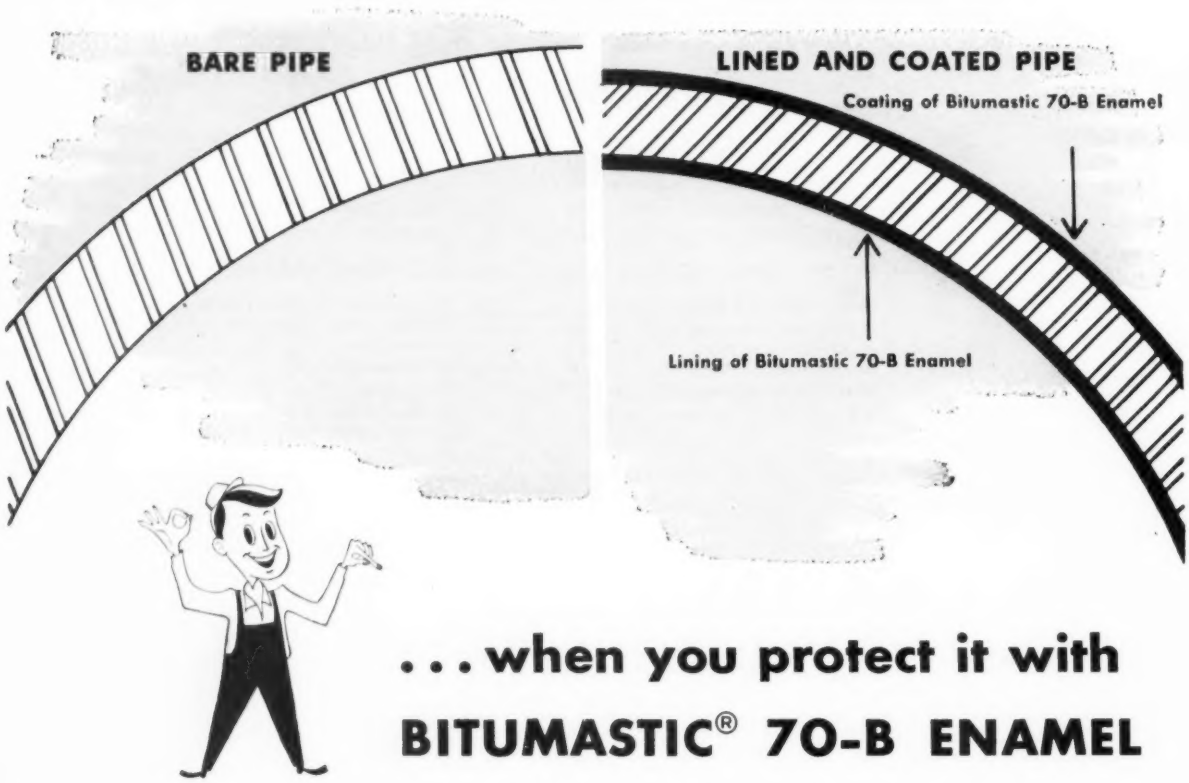
Yes—you can specify steel pipe —with less wall thickness



. . . when you protect it with BITUMASTIC® 70-B ENAMEL

BITUMASTIC 70-B Enamel—when applied to a thickness of 3/32"—protects the exterior of pipe from the corrosive action of the soil in which it is buried. It is much more economical to use this protective coating than to specify pipe with greater wall thickness in order to allow for future corrosion.

For instance, if it were calculated that a 3/8" wall would provide sufficient structural strength for a given pipe line, it would be unnecessary to specify a 5/8" wall to compensate for corrosion. The use of Bitumastic 70-B Enamel would do away with the need for the additional 1/4" of steel—a substantial saving.

Besides specifying less wall thickness, you can use *smaller* pipe by applying Bitumastic 70-B Enamel. A spun lining of this enamel *keeps* flow capacity high. So you don't have to buy *over-sized* pipe to allow for future "shrinkage."

Give your community this two-way savings on your large-diameter water lines by specifying strong, durable steel pipe, lined and coated with Bitumastic 70-B Enamel. If you wish, we will handle the entire coating job for you. Write for full information.

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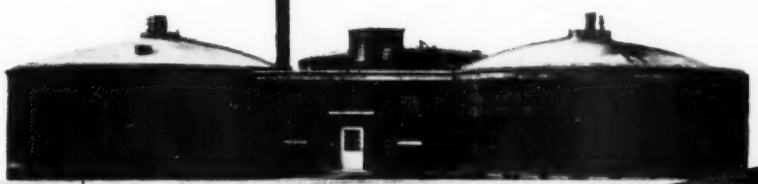
Interested in SIMPLIFIED Sludge Digester Heating?

In late 1950, two Spiral Heat Exchangers, each with a rated capacity of 200,000 BTU/hr., were installed at the Ley Creek Sewage Treatment Plant, Syracuse, N. Y.

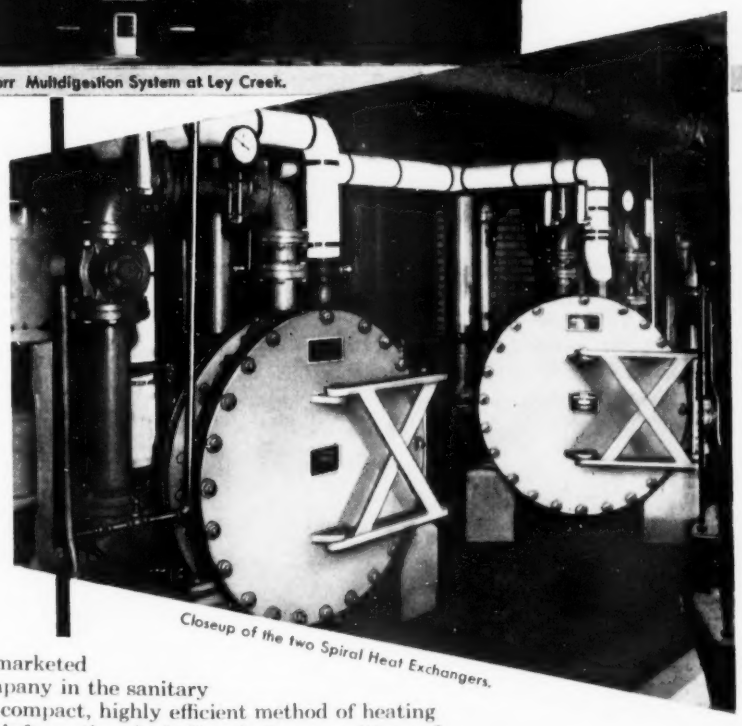
Reports direct from the Superintendent of the plant conclusively state that the units have operated successfully since initial start-up in January 1951 . . . that there has been no plugging in the Exchangers . . . and that they have done a very good job of heating the digesters, as shown by the data below.



General View of the Dorr Multidigestion System at Ley Creek.

At the Ley Creek Sewage Treatment Plant, Syracuse, N. Y., separate sludge digestion is carried out in a Dorr Multdigestion System with two Primaries and one Secondary. Each Primary is heated by a Spiral Heat Exchanger utilizing cooling water from a gas engine as the heat source. Operating data — for a twelve months period — is summarized below:

Number of units — 2
Rated capacity/unit-200,000 BTU/hr.
Avg. heat transfer — Exchanger #1 — 223,000 BTU/hr.
Avg. heat transfer — Exchanger #2 — 261,000 BTU/hr.
Maximum transfer recorded — 485,000 BTU/hr.
Minimum transfer recorded — 91,000 BTU/hr.



Closeup of the two Spiral Heat Exchangers.

The Spiral Heat Exchanger, marketed exclusively by The Dorr Company in the sanitary engineering field, is a simple, compact, highly efficient method of heating sewage digesters. For further information, including design capacities and sample specifications, write for Bulletin No. 6281, The Dorr Company, Stamford, Conn.

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TO THE CONTRACTOR *and* HIGHWAY ENGINEER

FOR years highway engineers have been working toward the elimination of road forms, and at the same time building a road that was known to be definitely level on both sides of the longitudinal joints.

Accuracy could be obtained at the shoulders with a line. The thickness of the course could be ascertained with a gauge but a line at the center of the road for establishing an absolute level was obviously impractical. Up to now, even with the most modern equipment, to arrive at any approach to accuracy in maintaining the level of a black top course over its full width was no more than a reasonably good guess. Matching devices can assure that one course will match the other course at the joint. In other words, both parallel courses will be the same depth where the courses abut, but the course at any given point may have a roll in it.

The shoulder remains true because of the line—The longitudinal joint can be tight—But, the center of the road is veiled in mystery insofar as its level qualities are concerned. There has been no means to correct the roll and dips that won't show under a straight edge.

Now, for the first time in the history of paving this situation can be corrected and it is possible for the contractor and Highway Department Engineers to know exactly what the condition of the road surface is insofar as its level characteristics and slope are concerned.

The direct-lift, one-piece-unit Cutter Bar Screed of the Adnun Black Top Paver has made possible the application of a Fluid Level to black top paving. The Fluid Level can be used either with a line for a primary setting along the edge of the road or without it. A simple, accurate device, it serves the purpose of leveling up a road course just as a carpenter uses a level to level up a structure. It permits correcting for any desired slope at any station. It permits holding an absolutely level grade without modifying the desired crown. It permits leveling up old shoulder and blending it into the crown, but most important of all it takes out the dips that won't show under the straight edge and it gives you absolute control of the laying of the *center of the road*. With the Adnun Fluid Level you both match and joint and *take out all the undulations on each side of the joint!* Your road is as level and true at the center as it is at the shoulder.

The Adnun Fluid Level should be standard equipment on every black top spreader. It means better, smoother, longer life roads for the State and County. It means less waste of material, smoother running jobs and better work acceptance for the contractor.

The season is opening! Now is the time to get the full story on this Adnun device. *Write for details.*

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BLACK TOP PAVER

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EQUIPMENT DIVISION
OF BLAW-KNOX CO.
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Anticipated Mileage Next 12 Months ..... Age of Youngest Driver in Your Household .....

Is Car Used for Business Purposes Other Than to and from Work?

☐ Yes ☐ No

Please send me low-cost Life Insurance information ☐

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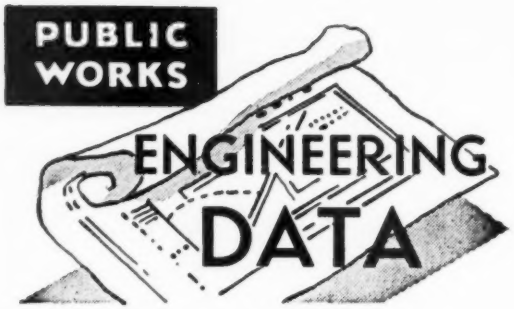
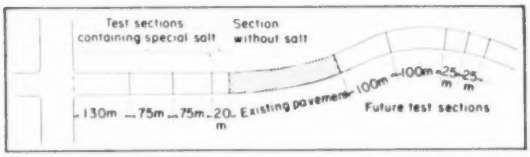


Mixing Salts with Surfacing for Ice-Free Pavement

According to an article in "Itzehoe", a German magazine, studies are being made of the possibility of adding low-temperature freezing salts to paving material to prevent accumulation of ice and snow on the road surface. This article was translated and briefed by A. C. Benkelman and published in Highway Research Abstracts. The experimental section was divided into four parts. The first 130 meters (426 ft.) were constructed hot with 6 percent of bitumen 80/120, the adjoining 75 meters (246 ft.) were treated with cutback asphalt and the last 75



● **TEST pavement layout showing sections treated with various bituminous materials to which a special salt mixture had been added. These sections remained free of frost at a time when heavy frost formed on other pavements.**

meters with cold tar. All bituminous cements were products of the Vialit Company. The additional substance employed to prevent formation of slick ice represented a mixture of five different components which was furnished by the inventor. This material was added to the binder. About 7½ percent of salts (33 kilograms per 440 kilograms) of binder were added. The only thing known of the components of the mixture is that they contained deionized water and sodium chloride; no details were given about the other components. This mixture was easily miscible with the bituminous binders. Even in the case of binders which had been heated before the admixture took place, no boiling was observed as would have been the case had normal water been added.

Preliminary experiments had shown that the admixture was not compatible with emulsified asphalt since it broke the emulsion immediately. The experiments concerning admixture to emulsions are being continued. The appearance of the pavement did not differ from that of a normal asphaltic concrete. A final 20-meter section was constructed without admixture in order to have a comparison under the same conditions.

The effect of the admixture has been observed so far only in one case in which, during very strong frost formation on other roads, the experimental section remained frost-free. The project will be under close observation during the winter, and the results will be reported at the end of the season.

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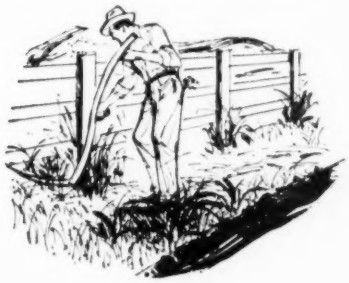

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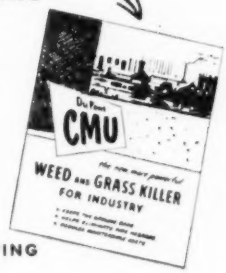

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NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

CIVIL DEFENSE FOR WATER SUPPLIES

Magazine

VOLUME 84 • No. 4

APRIL 1953

FRANCIS H. KINGSBURY,

Sanitary Engineer,
Massachusetts Department of Health

IN time of disaster that may result from enemy action, the provision of adequate water supply for domestic use and fire protection is second only in importance to rescue and treatment of injured persons. In Massachusetts there has been the experience of the major floods of 1927 and 1936, resulting from unusually heavy rainfalls, and the hurricanes of 1938 and 1944 which, in addition to wind damage resulted in flood damage from the accompanying heavy rainfalls. These disasters resulted in damage to water works and power lines over large areas.

While disaster resulting from enemy attack by saturation or atomic bombing would result in a maximum of damage in target areas and in areas adjacent thereto, the damage would be comparatively localized rather than extended, as in the case of the flood and hurricane damages. The catastrophe at Pearl Harbor well illustrates the localized damage which could occur from a surprise attack. Because enemy bombing may occur as a result of increases in the range of air transport, planning for such attacks must be considered. While definite target areas may be assumed, there is no certainty that, because of obscure weather conditions or military defense pressure, a miss might not result in considerable damage in sections outside the immediate target areas.

The problem of providing adequate water supply for the domestic use of the population and for fire fighting is not limited to the restoration of service in and near the target areas but must include provision for adequate water supply in areas to which population is evacuated. In these evacuation areas the population may be tripled, with consequent heavy demands upon the local water supply works.

Organization for Civil Defense

Water Supply—The Massachusetts Civil Defense Agency has within its Medical and Health Division a Section on Environmental Sanitation. The responsibility of this Section includes the maintenance or restoration of water supplies, plus the safe treatment of the temporary emergency supplies. At the State level it is the responsibility of this Section to advise the Director of Civil Defense and through him the nine Regional Directors of the Commonwealth, and to plan and carry out pre-disaster training programs at all levels. The personnel for such training activities in water supply matters are recruited from the Division of Sanitary Engineering of the Department of Public Health. In time of emergency the line of command will be from the State Director of Civil Defense to the Re-

● AS A PART of the Massachusetts civil defense training program, representatives of local water departments attend schools held in each region to study CD organization and familiarize themselves with emergency measures.

gional Civil Defense Director to the Local Civil Defense Director. Key personnel of the Environmental Sanitation Section will be present at State Headquarters and Regional Sanitation Consultants and Department of Public Health Advisors will work from the Regional Headquarters. The Regional Sanitation Consultants include experts on water supply operation selected from well-managed water departments within each region. The Regional Sanitation Consultants for water supply are familiar with the operating problems of water works and trained sanitary engineers of the Department of Public Health will supervise sanitation and treatment of existing and emergency water supplies.

Water Works Schools—During the pre-disaster training period water works schools to which representatives of local water departments are invited are being held in each region. At these schools general information is given on radioactivity and biological and chemical warfare. In addition, the organization of the Civil Defense Agency is outlined with information as to the relation of the water supply activities to other activities of the Medical and Health Services and of the Civilian War Aid Division. Particular emphasis is given to pre-disaster planning in determining the adequacy of the existing sources of water supply, having in mind the increased demands upon areas to which evacuees will be moved and the possible use of emergency or secondary water supplies.

Interconnection of Public Water Supplies — Emphasis is placed also on the interconnection of public water supply systems where such interconnections may reasonably be made and on the making of pressure and flow tests in adjacent systems. In 1951, the Massachusetts Legislature passed Chapter 531 of the Acts of that year, an amendment to the basic Civil Defense Act, Chapter 639 of the Acts of 1950, permitting the interconnection of water distribution systems of municipalities, districts and water companies. This amendment provides as follows:—

". . . Any city or town, water district, water supply district, fire and water district, fire district or water company may contract with any other such city, town, district or water company for the interconnections of their water distribution systems and for providing and using any necessary pumping equipment for the supplying of water for domestic, fire and other purposes. The supplying of water for domestic purposes for extended periods shall be subject to the provisions of section forty of chapter forty of the General Laws. Such interconnection made with the works of the metropolitan district commission or any municipality, district or water company supplied therefrom shall be subject to the provisions of chapter ninety-two of the General Laws". Municipalities are urged to provide such interconnections as advantageous not only in case of enemy action but in case of other disaster resulting from drought, flood, hurricane or conflagration.

Training of Auxiliary Personnel—In time of disaster some of the regular personnel of the water department may be injured and certainly the usual number of personnel will be inadequate to cope with major damage to the water works system. Emphasis is placed on the training of auxiliary personnel.

Survey of Works and Emergency Sources — Local water works personnel are urged to prepare plans in duplicate of the distribution system and supply works for deposit in two different locations and to review the capacities of pumping stations, treatment plants and distribution storage to cope with maximum domestic water consumption and fire protection needs likely to exist in time of disaster. Water works officials are requested to examine ponds and streams in the vicinity of the water works distribution system with a view to their use should the regular sources of supply be irreparably damaged.

Emergency Treatment and Power — As a part of the water works school emergency chlorinating apparatus of commercial and improvised types are set up and operated to familiarize water works superintendents with their use of disinfection of water mains and emergency sources of water supply. Many public water supplies have a single source of power. The water works superintendents are advised to consider installation of auxiliary sources of power which could be used in case of a breakdown in electric distribution systems.

Training of Treatment Crews — In addition to carrying on the water works schools, the Environmental Sanitation Section has made requisition from the Federal Government, with matching State funds, for water treatment equipment for training purposes. It is planned to install this water treatment equipment in the better managed water departments at strategic points in the Commonwealth where crews will be trained in their operation. This equipment will be of a type similar to that used by the army for the treatment of water supply for troops in areas where public water supply is not available.

Provision of Emergency Fire Supply —While the problem of providing for the minimum requirements of the population for drinking and culinary purposes is of paramount

(*Continued on page* 120)

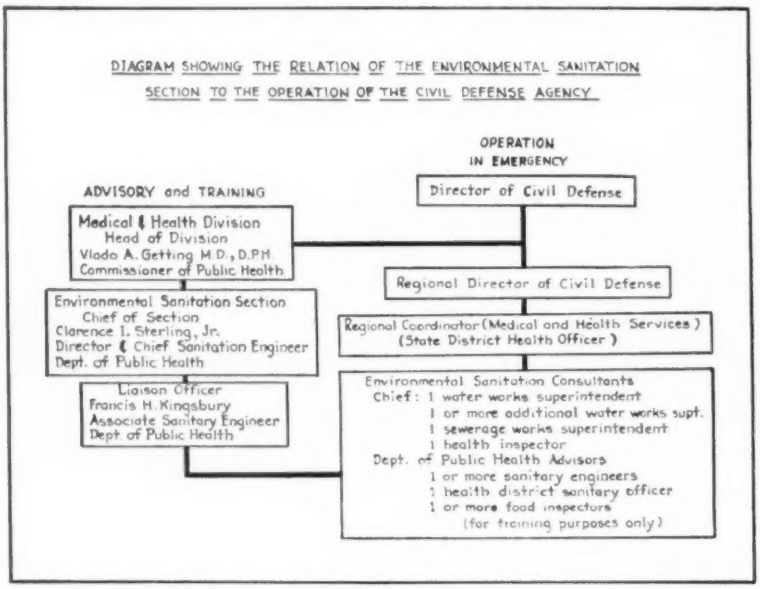


DIAGRAM SHOWING THE RELATION OF THE ENVIRONMENTAL SANITATION SECTION TO THE OPERATION OF THE CIVIL DEFENSE AGENCY
OPERATION IN EMERGENCY
Director of Civil Defense
ADVISORY and TRAINING
Medical & Health Division
Head of Division
Vlado A. Getting M.D., D.P.H.
Commissioner of Public Health
Regional Director of Civil Defense
Environmental Sanitation Section
Chief of Section
Clarence I. Sterling, Jr.
Director & Chief Sanitation Engineer
Dept. of Public Health
Regional Coordinator (Medical and Health Services)
(State District Health Officer)
Liaison Officer
Francis H. Kingsbury
Associate Sanitary Engineer
Dept. of Public Health
Environmental Sanitation Consultants
Chief: 1 water works superintendent
1 or more additional water works supt.
1 sewerage works superintendent
1 health inspector
Dept. of Public Health Advisors
1 or more sanitary engineers
1 health district sanitary officer
1 or more food inspectors
(for training purposes only)

● **ORGANIZATION chart shows important part played by regional personnel.**

SIDEWALK PATCHING

Need not be a Headache

GRANT E. HUEY,
Commissioner of Public Works,
Yakima, Washington

AS the City of Yakima's Commissioner of Public Works, I was faced with thousands of square feet of badly spalled sidewalks and with very little money allocated for repair. This problem had all the earmarks of a headache.

A meeting was held to discuss the extent, if any, of the liability of the property owners which would justify an assessment under the city code which held property owners liable for the condition of their walks. However, as most of the area involved had been torn up in sections for various purposes and replaced as late as 1947, it was felt that it would be unfair to force property owners to pay another assessment; especially when the reason for the spalling could not be determined to everyone's satisfaction.

Some members of the department felt that the spalling was caused by the use of de-icing salt; but this was not borne out by experience in older sections which, although having been salted, showed no sign of spalling. It was my opinion that the concrete had been over-troweled, causing a crust to be formed that was more easily broken down by the freeze-thaw cycles.

Two alternatives faced us: (1) Replace the sidewalks, which we did not feel was practical, aside from the cost, in that it would seriously hamper the merchants and interfere with pedestrian traffic. (2) Find some material that would bond to the old walk satisfactorily in both deep and thin fills, be able to withstand both the very hot summer weather prevalent in Yakima and our sub-zero winters, and be durable enough to withstand heavy traffic. To do all this is a tough job for any material.

We laid down several test panels using hot asphalt and sand as well as emulsified asphalt mastics. Our final selection was an asphalt emulsion sold by the American Asphalt & Bitumuls Company under the trade name of Laykold Binder. However, instead of using Portland cement as the setting agent, we used a calcium aluminate gypsum cement which gave us a very rapid set as well as a mastic tougher and more resistant to heat. This mastic was then topped with a very thin surfacing of Wearcoat manufactured by the same company. The rapid set was desirable so that traffic areas would need to be closed no longer than a day at most, before returning to service.

Working procedure was as follows: Scaling material was loosened with a hammer and the area swept clean. A dilution of one part of Laykold Binder to three parts of water was brushed over the area as a prime coat. One part of calcium aluminate gypsum cement was dry mixed with two and one half parts of plastering sand. Water was then added and followed by one part

(*Continued on page* 121)

Photo by The Yakima Daily Republic

● **CONDITION of a typical sidewalk before start of the resurfacing program.**

● **SAME AREA after resurfacing. Depth of fill averaged slightly over ¼-inch.**

PARKING:

CHICAGO TACKLES ITS PROBLEM

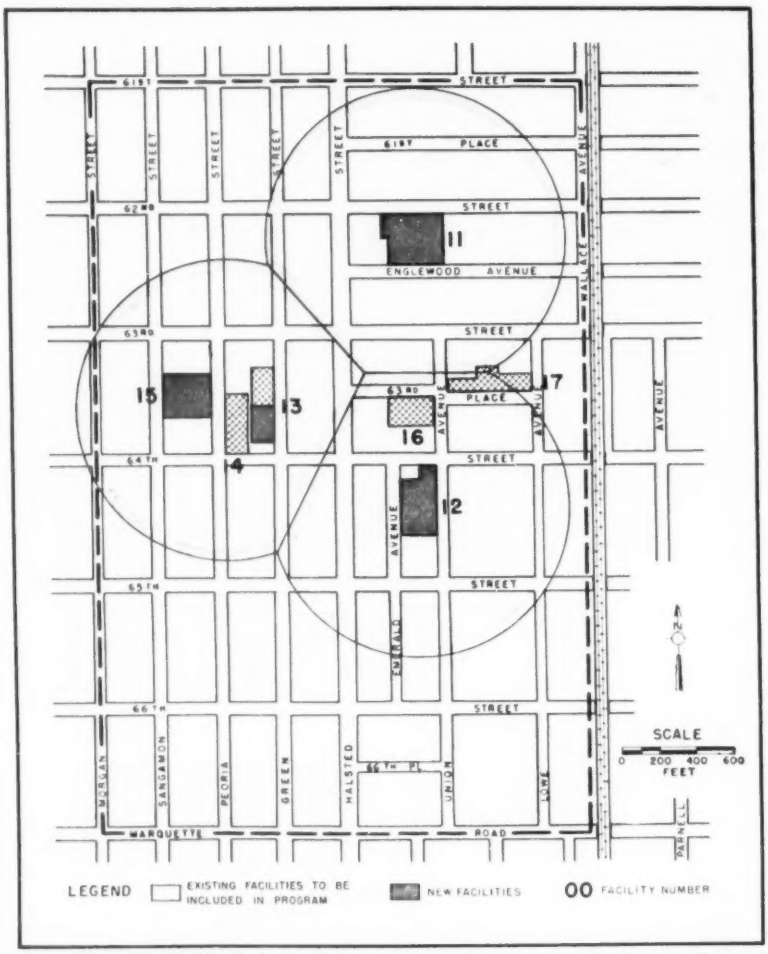
PHILIP HIRSCH

CHICAGO will soon launch the biggest effort ever made by a major city to alleviate the parking shortage in downtown areas. A total expenditure of about $36 million is planned during the next two years. This program will provide space for 11,578 vehicles which now can find no parking in the city's crowded business districts.

The money will be spent on 11 sites in and near the downtown section, plus eight sites in a busy shopping area on the south side. The plan includes two structures of twelve levels each, one of seven and two of five stories. One garage, with a capacity of 2,359 vehicles, will be the largest in the nation.

This structure will be built on the east side of Michigan avenue, between Randolph and Monroe streets, on the doorstep of the Loop—Grant Park. The garage will extend under the Michigan avenue roadway to within about 40 feet of the west curbline.

More than four years of joint effort by city and civic agencies is behind the program. An important by-product of this effort is that a permanent procedure for constructing additional off-street facilities in outlying sections of Chicago has been worked out. Already, surveys of additional sites are underway in the area adjacent to the Loop, where some of the approved facilities will be built.



● **TYPICAL PARKING SURVEY shows shopping area at 63rd and Halstead Streets. Proposed off-street parking facilities and tributary areas are outlined on map.**

Three Phases

The program is divided into three phases. Along North Michigan avenue, the prestige shopping area just outside the Loop, four garages are planned. These will have a capacity of 2,888 vehicles and cost about $7,800,000, including $6,621,000 for land acquisition and construction.

Within the Loop, five structures will be built. They will hold 3,879 vehicles and cost about $9,850,000 for land acquisition and construction. In the vicinity of 63rd and Halsted streets, about eight miles south of the Loop, four new parking lots are planned, plus modification of four existing facilities. Land and construction costs are estimated at $1,443,000.

The 2,359-vehicle underground facility in Grant Park is one of two garages planned by the city's park district, an autonomous branch of the city government. Plans have been drawn for a second underground structure at the south end of the park, with a capacity of 1,652 vehicles. Bonds will not be floated for this project until the construction of the garage at Michigan and Randolph starts. Cost of this garage will total $8,300,000. The entire Park District program—third phase of the overall project—will cost about $13,500,000. This bond issue is independent of the one financing the facilities in the Loop, on North Michigan Avenue and in the vicinity of 63rd and Halsted Streets.

The Michigan-Randolph garage will contain two floors and a mez-

● **SPACE for 700 vehicles will be provided in this garage, one of 11 planned for central business area.**

zanine level with an area of about 873,000 square feet. It will be located under 7.47 acres of park, and extend 90 feet under Michigan avenue. The roof of the garage will be about four feet below the present grade. There will be a plenum chamber above the upper level on that portion of the garage under Michigan Ave. The plenum chamber roof will form the Michigan Avenue roadway.

Walls, floors, and columns will be constructed of reinforced concrete. Entries to the garage will be by means of two descending ramps from Michigan avenue to the upper garage level. One ramp will be located at the east curbline of Michigan avenue, between Monroe and Madison streets. The other will be on the centerline of the roadway, between Randolph and Washington streets. Exit ramps will be located on the east curbline of Michigan avenue between Washington and Randolph streets, and on the Michigan avenue center line between Madison and Monroe streets.

All ramps will be equipped with radiant heating panels to prevent accumulation of snow and ice. The entry and control center, waiting room, locker rooms, and rest rooms will be finished in glazed tile and glass set in aluminum. Escalators will be provided for customers on Michigan avenue at three locations.

Garage ventilation will provide for a change of air every four minutes. Electric relays set in the ramps and aisles will count the number of cars entering and leaving. These tallies will register on a board in the garage office, enabling attendants to route incoming cars with maximum efficiency.

The facilities planned by the main branch of the city government will be built in the Loop, along North Michigan avenue, and in the vicinity of 63rd and Halsted streets. Details of these phases of the program were worked out under a procedure which will be followed in erecting future off-street parking areas.

A syndicate of five local investment firms helped finance the nine sites in the Loop and along North Michigan avenue. Under a "proceedings contract" worked out between the city and the bankers, the latter agreed to make a preliminary survey to determine the location, size, and type of revenue bonds to be issued for the project. Preparation of construction blueprints and acquisition of land was left to the city, after preliminary details had been settled.

The plan, when completed, was sent to the traffic and public safety committees of the Chicago city council. The plan included the amount of revenue bonds required, the dates of bond issue, maturity dates, interest, and other details. After consultation with the Chicago

● **MODEL of three-level underground garage designed to hold 2,359 vehicles.**

Plan Commission, the Bureau of Streets, the Department of Subways and Superhighways, and other affected agencies, the off-street garage plan was submitted to the city council. Final council approval of sites and bond issues came on Oct. 8, 1952.

Project Guarantees

The proceedings contract provided guarantees for both sides. In the event the bankers had decided the project was not feasible, they would have borne all investigating costs. If the council had decided to float the revenue bonds through an agency outside the banking syndicate, the city was required to pay one and one-half percent of the par value of the bonds to the bankers.

Under the bond issue ordinance approved by the council, all bonds issued for the program are "payable solely, exclusively, and only from proceeds of the facilities already approved or those which may be authorized in the future under the statute." Purpose of this provision is to exempt other city income and property from liability.

The ordinance provides that additional bonds may be issued as the need for more parking facilities arises.

These additional facilities will probably be requested by civic groups similar to those which backed the present program. Behind the garages along North Michigan avenue was the North Michigan Avenue Association, a group of property owners in the area. The State Street Council, which includes merchants from the stores along the famed commercial artery, and the Chicago Association of Commerce and Industry, pushed the Loop program. Sponsoring the facilities at 63rd and Halsted was the Englewood Joint Parking Committee, a group of neighborhood businessmen.

Under the bond issue ordinance, the total cost of the program is limited to $50 million. This leaves an authorization of roughly $27 million for future planning when the $8,300,000 to be raised by the park district for the Grant Park garage is deducted from the overall cost of $36 million planned for all of the garage facilities.

Additional parking spaces may be built by the city after a supplemental ordinance has been passed which includes a cost estimate, details of the bond issue, construction details of the new facilities, and approval of an independent engineer and legal counsel.

Construction costs of the garages on North Michigan avenue and in the Loop will average $4.30 a square foot, according to estimates. The land cost will range from $15 to $42 per stall in the downtown facilities. On North Michigan avenue, land costs per stall will be about $10. In the Grant Park facilities, construction cost per square foot will be about $9.50.

A typical ramp in the proposed facilities will be 12 feet wide in each direction. Aisles will be 20 to 22 feet wide. Columns two feet by two feet will be spaced 26 feet on centers in most of the facilities. But in some, bays will measure 29 feet by 29 feet, or 32 feet by 27 feet on centers. A typical stall will be 8½ feet by 18 feet.

The ramp type garages in the Loop and on North Michigan avenue will be built to permit self-parking by customers. Those with elevators

will require attendants. The facilities in Grant Park will be geared for both types of operation.

An idea of how the project will pay for itself is provided by the park district facility. This garage will have operating expenses of about $389,618 annually, according to estimates. These expenses break down to an estimated $299,618 for garage operation on a self-parking basis, plus $90,000 for attendants' wages and uniform costs. The charges are figured for a 24-hour operation, 365 days of the year.

Parking rates in the Grant Park garage will range from 45 cents to $1.10 for self-parkers, and 15 cents more for attendant parking. The rates will increase from 45 cents and 60 cents for one hour to 75 cents and 90 cents for three hours, by increments of 15 cents an hour. The $1.10 and $1.25 rates will be charged for more than three hours. Rates of 60 cents and 75 cents will be charged for the hours from 6 p.m. to 5 a.m.

This schedule is 20 to 25 cents an hour less than fees charged by private operators in the area for short term parking. Attendant rates for the same period will be five to 10 cents less than those charged by private operators. Long-term parking rates were set at 220 percent of the rates charged at existing open air parking lots maintained by the park district and at about 65 percent of the term rates charged in private attendant parking facilities.

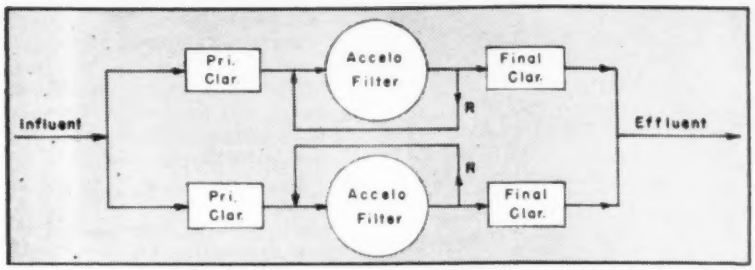
The facilities planned by the city are not designed to replace private parking lots and garages. The project will still leave room for the development of private parking facilities. In the area to be served by the Grant Park garage, for example, cordon counts and surveys show that parking is required by more than 16,600 motorists on an average weekday. Based on a 1.9 turnover of parkers, these cars require 8,750 spaces. At present, 5,417 parking spaces are available in this area, virtually all in private parking lots since curb parking is prohibited during the day in all parts of the Loop and at any time in many locations.

The difference between available and needed space, based on these figures, is 3,333. The 2,359 spaces in the Grant Park garage will still leave a deficit of nearly 1,000 spaces a day.

In the area near the garage planned for Wacker drive and Madison street, there is a need for 7,000 spaces on an average weekday. The supply in this adjacent area is 3,800 spaces. This leaves a gap of 3,200 spaces. The garage planned for this area will have room for 1,300 cars, but since it will be built on an existing parking lot, the net increase in parking spaces will only be 1,000. As a result, there will still be a deficit of more than 2,000 spaces after the structure is completed.

Estimated annual revenue at the Grant Park garage will be $1,046,150. This figure includes a 15 percent "safety factor" reduction. Subtracting the $389,618 annual operating expenses, the amount available for debt service is $656,532. This figure is more than 25 percent over the yearly charges on the 30-year revenue bonds issued to finance the project. Interest rates on the bonds will range from 3⅛ to 3¼ percent.

Off-street reservoir parking space will be provided at all the garages. This system will prevent the long lines of waiting autos which are a common occurrence at many existing facilities.



The Winner, S. D., plant was designed for a maximum flow rate of 0.526 mgd. Primary clarifiers are rectangular. The filter is 60 ft. in diameter and 6 ft. deep. Tests were carried on during January, June and July of 1949. During the June test period, average flow was 142 gpm and the results of tests on composited samples showed an average raw sewage BOD of 387 and a final effluent of 22 ppm. Filter loading was 0.28 lb. per cu. yd. Recirculation was 400 gpm. Without recirculation, tests the following month showed raw sewage BOD 413 and final effluent 45.

tanks can be used resulting in a substantial saving in initial investment.

2. The favorable environment for aerobic organisms maintained by continuous direct recirculation greatly accelerates biological oxidation.

3. Higher dosage rates may be used with a resulting increase in treating capacity of existing conventional filters.

4. Clogging and ponding, with their attendant difficulties, are practically eliminated.

5. Continuous uniform dosing keeps the filter wet and results in greatly reduced breeding of the psychoda fly.

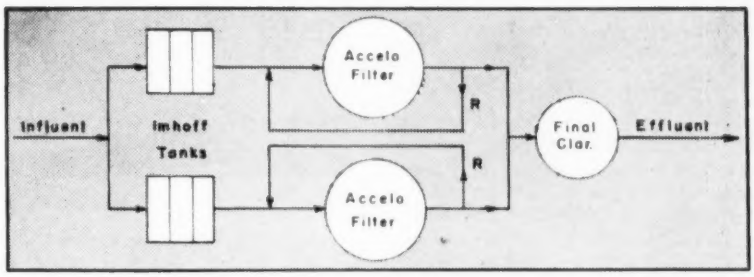
The Accelo Filter System of Sewage and Waste Treatment

H. W. GILLARD
Infilco Inc.

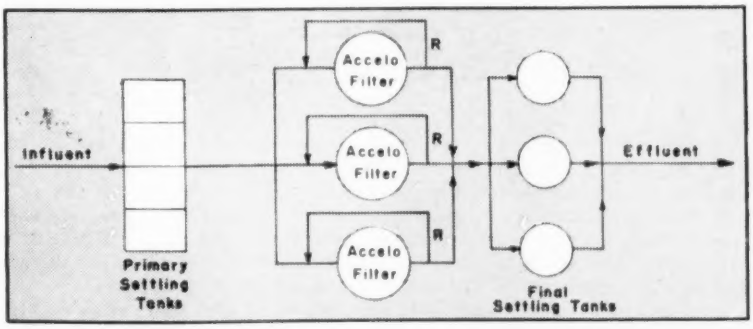
DIRECT recirculation of unsettled effluent from a biological filter back to the inlet of the filter or to a preceding filter is the basic principle of the Accelo Filter systems in the treatment of sewage and other organic wastes. Either conventional rate or high rate filters may be designed to include direct recirculation. In either case continuous filter dosage serves greatly to minimize, if not to eliminate, odors and insects sometimes experienced with filters dosed intermittently. A well nitrified effluent with a low BOD can be obtained with the conventional rate Accelo Filter (loaded to about 0.3 lb. per cubic yard). The high rate unit will provide a greater BOD removal per unit volume of filter media but will rarely provide nitrification. Thus selection of filter size and loadings may be made to obtain the desired quality of effluent.

The direct return of active aerobic organisms, so that the pollute contained in the incoming waste is continuously available to them, results in intensified biological oxidation. This is the basis for the successful use of direct recirculation in the Accelo Filter systems. Several such systems are covered by patents, issued and pending. Advantages of the method are:

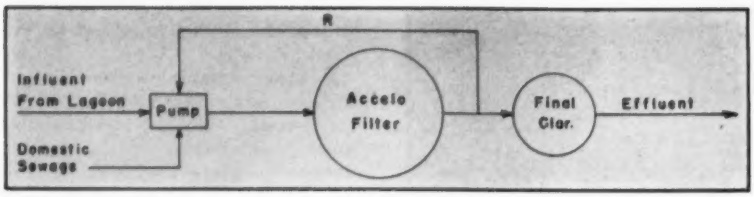
1. Since no recirculated sewage goes into either the primary or the final sedimentation basins, smaller



The plant at Xenia, O., was designed for an average flow of 1.25 mgd. Imhoff tanks are used as primary clarifiers. The Accelo Filters are 62 ft. in diameter and 6 ft. deep, with Accelo Hi-Cap underdrains. The final clarifier is 50 ft. in diameter with an overflow rate of 637 gsfd. Samples were taken on May 4 and 5, 1949, composited over the 24 hours. The average flow was 1.62 mgd; raw sewage averaged 107 ppm BOD, the primary effluent 60 ppm and the filter effluent 33 ppm. The loading on the filter was 0.65 lb. per cu. yd. and the recirculation 0.65:1. Suspended solids were reduced from 147 to 76.



With a design average flow capacity of 2 mgd, the Ames, Iowa, plant has four primary clarifiers of the rectangular type, 135-ft. Accelo Filters with 8 ft. depth of media and three final clarifiers. Test runs on this plant in October and November, 1952, showed the flow to be 2.0 mgd, raw sewage BOD to average 281 ppm and final effluent 37 ppm. The recirculation ratio was 2:1.



The plant at Saegerstown, Pa., was designed for phenol removal. Design maximum flow is 96,480 gpd. The phenol-containing waste is drawn from lagoons. Tests were run in both 1951 and 1952. Flows varied from 4.7 to 17.0 gpm and the lagoon effluent contained from 10.9 to as high as 278 ppm of phenol. The filter is 28 ft. in diameter and 6 ft. deep, with Accelo Hi-Cap underdrains. The final clarifier is 12 ft. in diameter. The effluent, in ppm of phenol ranged from 0.3 to 0.56. Phenol removed per 1,000 cu. ft. of filter ranged up to 7.56 pounds per day. Recirculation varied from 43 to 93 gpm.

Flow Diagrams

The flow diagrams shown on page 73 may be used for either conventional or for high filter rates. The reduction in BOD and suspended solids given below are based on high rate application with 1:1 recirculation for normal strength domestic sewage. It will be appreciated that greater reductions and nitrification can be obtained with conventional rate application to the filter.

Diagram A illustrates a single-stage layout and is recommended for use where 75% to 80% overall removal of suspended solids and BOD are acceptable.

Diagram B shows a two-stage plant with no intermediate clarifier, and with recirculation of secondary filter effluent back to the inlet of the primary filter. Overall removals of 80% to 85% may be expected. Somewhat greater reductions can be obtained by including the optional split feed which applies raw settled sewage to both filters.

● **SEWAGE TREATMENT plant at Washington, Ind., uses the Accelo Filter system.**

Diagram C indicates a two-stage plant similar to that in diagram B but with direct recirculation within each stage. Reductions of 85% to 90% should be obtained.

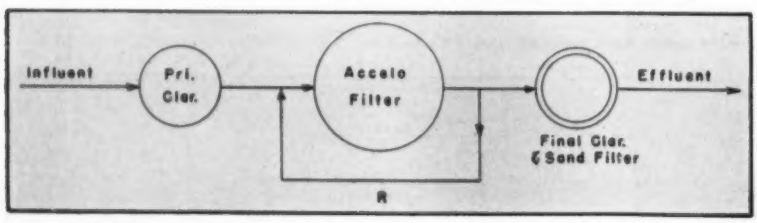
Diagram D shows a two-stage arrangement with direct recirculation around the filter of each stage and intermediate clarification between the two stages. This layout is excellent where removals in excess of 90% are desired.

Diagram E is similar to diagram D except that the effluent from the secondary filter is recirculated back to the inlet of the primary filter. This layout should produce overall removals of 90% or better.

Selection of the flow diagram and rate of application for a particular project will be governed by such factors as: the degree of treatment required, topography of plant site, existing treatment facilities, and possible savings in initial investment for recirculation pumps and piping with operation cost for power. Various combinations of these flow patterns may be included in a plant design. Primary roughing filters may be employed in multi-stage treatment of high strength wastes.

Biological oxidation in a trickling filter proceeds most rapidly and efficiently when the biological population in the filter is in an active, healthy, pollute-hungry condition. This condition requires ample oxygen, ample food and proper temperature. For optimum removal of organic pollute, these factors, together with adequate contact time, make up the essentials of excellency in filter operation. Treatment results from actual installations of the Accelo Filter are given elsewhere in this article.

The intensified biological action is no doubt the prime reason for the absence of clogging in filters employing direct recirculation. Although the flushing action of the dosage of high rate filters may also be a factor, the number of conventional rate Accelo Filters in service which have not experienced clogging substantiates the intensified biological action theory.



The Schulenburg, Texas, plant was designed for a maximum flow rate of 0.180 mgd. The primary clarifier is 20 ft. in diameter, and the filter 40 ft., with 6-ft. depth of media. Final clarifier is also 20-ft. Composited samples taken over a 24-hour period in June, 1950, when the average flow was 41 gpm, showed raw sewage BOD at 153, filter effluent at 35 and final effluent at 13. A sand filter followed the clarifier. BOD loading on the filter was 0.17 lb. per cu. yd. and recirculation was variable. Suspended solids were reduced from 200 to 10 ppm. Flow during the test period varied from 15 to 85 gpm.

The plant at Mineola, Texas, includes a primary clarifier, a 62-ft. filter 8 ft. deep, a final 32-ft. diameter clarifier and a final sand filter. Samples taken hourly over an 8-hr. period in March, 1949, with an average flow of 86 gpm, showed a raw sewage BOD of 177, a primary effluent of 85, a filter effluent of 37 and a final effluent of 5 ppm BOD. Loading on the filter was 0.1 lb. of BOD per cu. yd. and recirculation was 10:1. During sampling, flow varied from 42 to 135 gpm.

Bases of Design

In the design of an Accelo Filter plant for either high rate or conventional rate operation, both primary and final clarifiers should be selected on the basis of flow in accordance with requirements of the local State Sanitary Engineering Division. The usual practice is to provide an overflow rate of not more than 800 gallons per square foot per day and a detention time of 2 to 2½ hours based on the average sewage flow rate.

Final plant effluent requirements will dictate the selection of application rate. Topography of the plant site and other local conditions may influence selection of the flow sheet to be used. Knowledge of effluent requirement will also be needed to determine the permissible loading on the filter and the degree of recirculation for projects designed in accordance with the standards proposed by the Upper Mississippi River and Great Lakes Boards of Engineers. For projects not using these standards, design curves furnished by the manufacturer may be used as a design basis.

BOD Unit Loadings.—For the treatment of normal domestic settled sewage a loading of 1 to 1.5 lbs. of BOD per cubic yard of filter media, which is equivalent to 1,613 to 2,420 lbs. per acre-foot per day, may be used for single-stage high-rate filters in the northern states; and a loading up to 1.87 lbs. per cubic yard per day, or 3000 lbs. per acre-foot per day, in southern states. A maximum hydraulic loading of about 30 mgd, including recirculation, should be used. It will be noted that these design loadings will come within the requirements of the Upper Mississippi Valley joint statement of policy for the high-rate filter.

If the receiving stream characteristics indicate the need of a well nitrified plant effluent, a low-rate filter loading rate of 400 to 600 pounds of BOD per acre-foot (0.25 to 0.37 lb. per cubic yard) of filter media per day should be used; and on this basis the hydraulic loading will seldom exceed 6 mgad. Some results of operation from recent installations show what can be accomplished with direct recirculation. Phenol removals at Saegerstown, Pa., in the treatment of industrial wastes will be of particular interest.

Materials

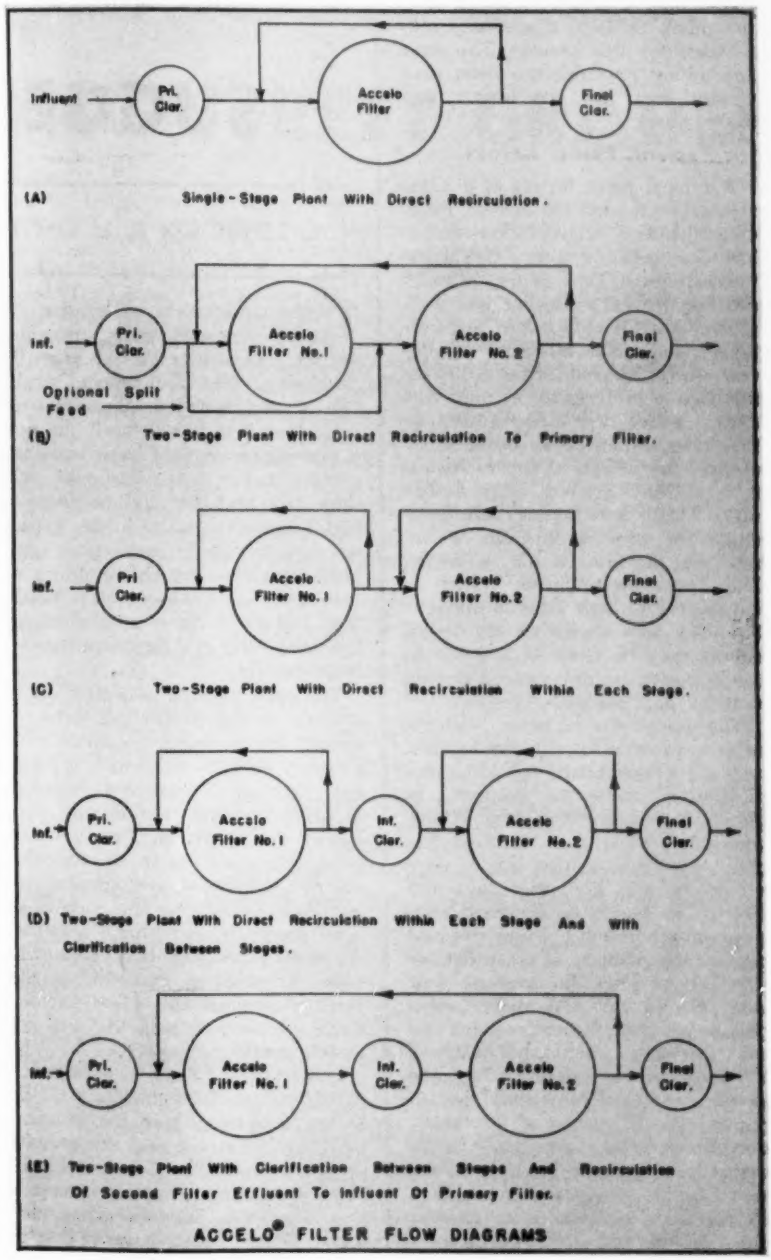
Accelo Hi-Cap underdrain tile and filter media 3-inch to 4-inch in size should be provided for better ventilation. Tile wall reducers for the Hi-Cap tile are available which provide increased ventilation. These tile and reducers are made for all types of high rate or high capacity filters.

Slope of the underdrains and the collection channels should be chosen to handle maximum flow rates with ample conduit area available for good ventilation. Slopes of 0.5% to 1% are recommended where plant site topography permits. Such gradients will usually provide cleansing velocities of 2 feet per second or more. These gradients will also permit higher than design capacity should unknown future loads require it.

Rotary distributors equipped with Aero-Spray nozzles are furnished for high rate Accelo Filters. It is obvious that each rotary distributor must be designed to function properly at the flows and under the head conditions of a particular project.

Pumping Details

If available head at the plant site permits gravity flow through the entire plant, recirculation pumps controlled by an automatic float switch in a control well will serve



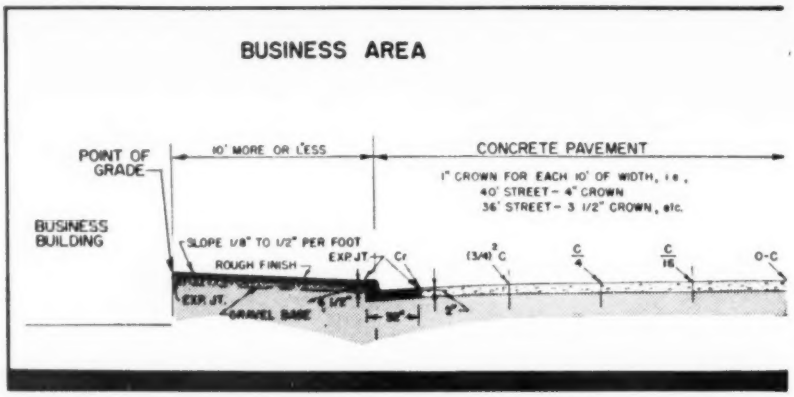
to maintain a predetermined constant head on the distributor. Where pumping at the plant site is required the same pumps may be used for both functions of lift and recirculation; they also may be used where material to be directly recirculated flows over a weir from the filter effluent well into a wet well which receives settled sewage from the primary clarifier. The liquid surface elevation and consequently the head on the weir are more or less fixed by the effluent weir level of the final clarifier, consideration being given to clarifier feed pipe and other losses. Any high-grade open-impeller type centrifugal sewage pump or axial flow pump may be used for this service. The axial flow pump provides the most economical unit for the higher discharge rates.

Typical Plant Layout

A typical plant layout of a high-rate or high-capacity Accelo Filter with lift and recirculation pumps includes grit remover, Griductor, Parshall flume flow meter, primary clarifier, primary clarifier wet well, control well, Accelo Filter, filter effluent well, final clarifier, digester and sludge drying beds. Although the layout refers to a high-rate Accelo Filter, the direct recirculation system may be advantageously used in the design of any biological filter at any desired filter dosage rate. The plant layout would be much the same as that shown except that the filter would be larger. The direct recirculation system is not limited to high rates of application. The data shown on the design curves may be used as a guide in the selection of the desired dosage rate for any particular project.

The pumps should be in duplicate so as to provide for standby service, and the entire plant, including the distributor, must be designed to handle maximum flow rates. Where there is gravity flow through the plant, and recirculation pumps only are to be provided, the plant and distributor should be designed with a maximum discharge capacity equal to the total capacity of all recirculation pumps plus the average flow rate. Where lift and recirculation pumps are used, the entire plant and the distributor should be designed to discharge a maximum volume equal to the total discharge from all pumps. The discharge of any reaction driven rotary distributor is directly proportional to the square root of the head; therefore, if a distributor discharge range greater

(*Continued on page* 131)



● **THEORETICAL RELATION of buildings, curb, street and walk in business area.**

SUGGESTION FOR

H. L. LEIBEE and R. L. SMITH

THE establishment of grades for street improvements involves certain fundamentals frequently overlooked. The ideal time to establish grades is when the property is platted into blocks and lots and the necessary streets have been located. In the past, this was seldom done and the engineer now is called upon to establish the grades at a time when properties have been developed by the building of residential and commercial buildings and there have been more or less temporary and haphazard street improvements.

The main purpose of a street is to provide access to the property. It should be designed to serve that property with the minimum of damage; and also to provide drainage of surface waters to available outlets or storm sewers. The first and most important units to consider are the residential and commercial buildings; second is the sidewalk; third the curb; and fourth and last the street traffic way. If we acknowledge to ourselves that this is the order of prominence of the various units, the abutting property will get its fair consideration.

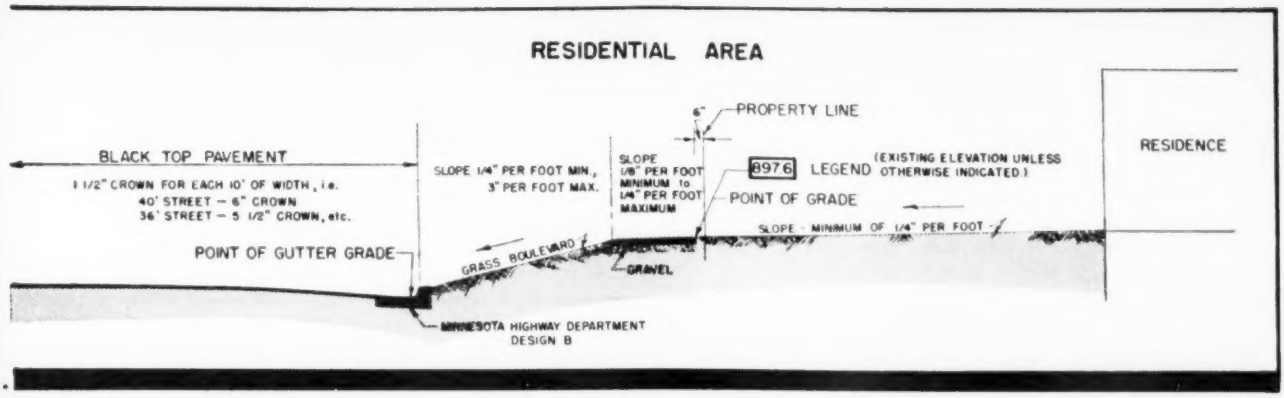
The point of "Established Grade" should be the elevation of the inside of the sidewalk where the municipally owned street and the private property meet. There are four of these points at each street intersection. They may have the same elevation but generally cannot, due to the contour of the ground. Under normal conditions the sidewalk grade should be at an elevation to permit a fall of at least one quarter inch per foot from the house to the sidewalk.

Figure 1 which is a cross section of the total street, shows the minimum and maximum conditions between the various units. The sidewalk should have a slope towards the street of about one eighth of an inch per foot. Under normal conditions, the rate of fall between the sidewalk and the curb on residential streets should not be less than one quarter inch per foot nor more than three inches per foot.

Curbs and Gutters

Curbs should have a maximum height of six inches so as not to strike car bumpers or interfere with the opening of the car doors when parallel parking is in effect. A combined curb and gutter is desirable as it provides an excellent grade line for the side of the street and an easier flow for the surface water.

In the case of business district walks extending for the full distance from the building to the curb, the slope should not exceed one half inch per foot to avoid accidents due to ice in freezing weather. In case it is difficult or impossible to meet the qualifications of a six-inch curb and a slope of one half inch per foot and meet the building entrance, the rebuilding of the entrance is the logical procedure. In case this is impractical, the use of a special section with a step-up placed 18 inches in from the curb can be considered.



● **RESIDENTIAL AREA, with suggested slopes of each section. Pavement types shown are interchangeable.**

ESTABLISHING STREET GRADES

Fig. 2 shows a cross-section of a street where the traffic way has been kept level and the natural slope of the ground ignored. This kind of grade can result in heavy damage to property on both the high and low sides with little if any benefit to the street. It even produces an effect of having the street tipped into the slope and makes the residence on the low side appear even lower than it really is.

Hillside Layouts

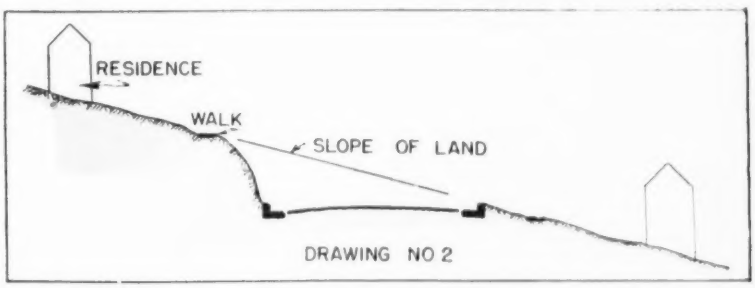
Fig. 3 shows the street tilted to conform more nearly with the general slope of the ground and makes the street with adjacent residences appear more level. The general appearance of the street treated in this way is good, and little if any damage results to the property adjoining the street.

The maximum limit of tilting a street surface probably approximates nine inches to ten feet of street width or about three feet for a 40-foot street, with wider streets in proportion. The crown of the street should always be maintained at the center line by making the surface symmetrical on a chord drawn between the edges of the gutters. No attempt should be made to shift the crown towards the high side or to maintain the drainage in the upper gutter when the surface is heavily tilted as it will distort the surface, produce an undesirable appearance and be harder to construct.

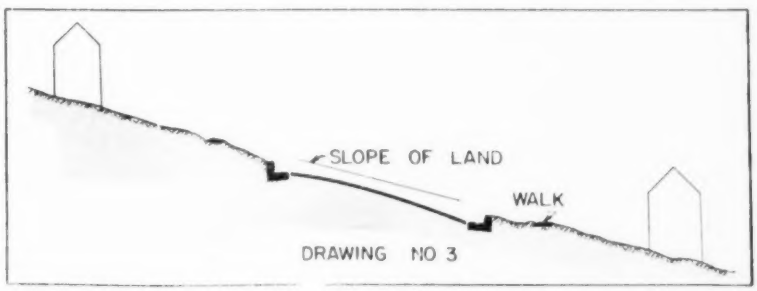
The crown of the street is most easily and quickly set by the "teeing" method. Three tee stakes three to four feet long are required. The center line or crown is set by sighting across between the gutter edges to a point on the center tee the crown height below the top of the tee. The quarter point is set three quarters of the crown height below the top of the tee.

There is no good reason for attempting to make the two sides of the street parallel. One side may be set on a tangent between block corners and the other side set on a vertical curve more nearly to follow the ground surface. The effect of this kind of distortion is to make the street fit into the general contour of the ground. It has an excellent visual effect and permits avoidance of damage to abutting property. The tee method of setting crown grades takes these deformations of the street surface in stride.

Street grades should be established for the long future. As stated before, drainage is an important factor to consider. Storm sewers should well be considered as a necessary part of the street design and may prove to cost as little as the damage to the property resulting from carrying surface water long distances in the gutters.



● **ON HILLSIDE streets, a level traffic way accentuates slope of the ground.**



● **STREET tilted to conform with natural slope improves access and appearance.**

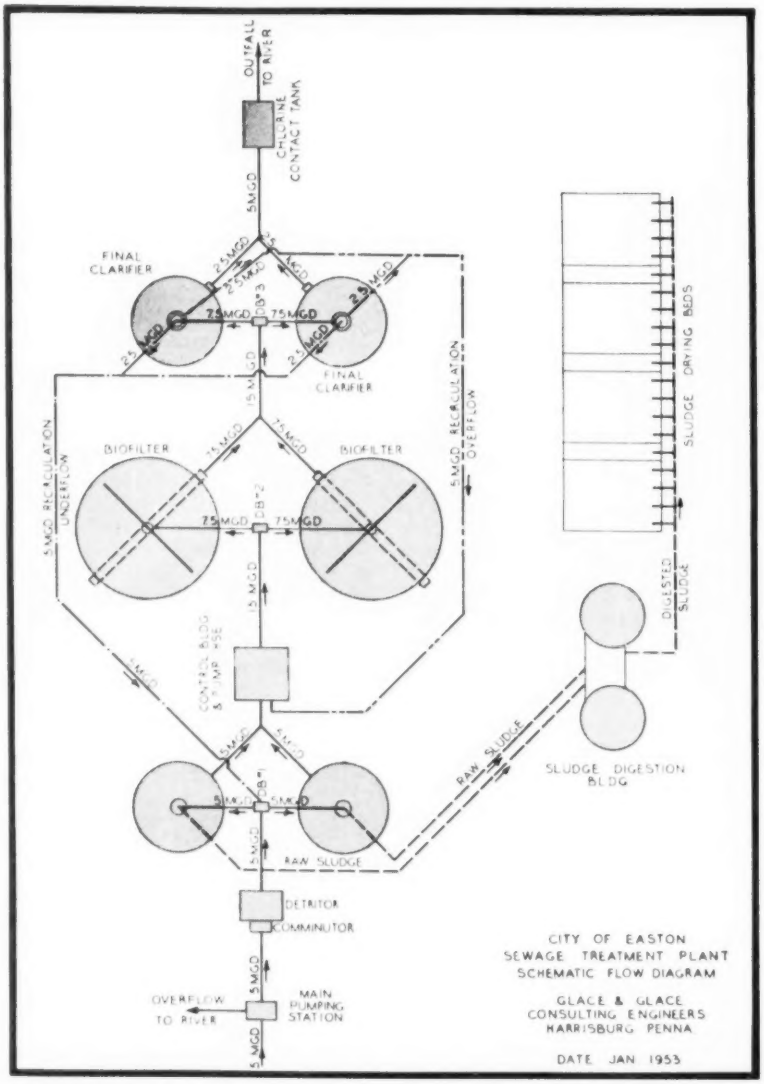
new

SEWAGE TREATMENT PLANT IS SHOWPLACE OF CITY

H. C. HERBERT,
Chief Engineer, Glace & Glace,
Consulting Engineers, Harrisburg, Pa.

ANOTHER important forward step in Pennsylvania's Clean Streams Program was taken when the city of Easton, Pa., placed its new sewage treatment plant in operation. The crystal clear effluent discharged by this plant into the Delaware River will be a welcome sight to the city's downstream neighbors and will contribute a large part to the cleaning up of that historic stream; and the pleasing appearance of the new plant is expected to be an additional public relations asset.

Prior to the construction of the new plant, Easton, with a 1950 population of 34,410, and the adjoining Borough of Wilson, population 8099, were served by a primary sewage treatment plant, built in 1928, heavily overloaded and providing only token treatment in late years. Moreover, a portion of the sewage flow was discharged through combined storm and sanitary sewers directly to the Delaware and Lehigh Rivers. To correct these conditions, and to comply with a directive of the Sanitary Water Board, the city, in 1945, engaged Glace & Glace of Harrisburg and Whitman, Requardt & Associates of Baltimore, as consultants to prepare plans and specifications for a treatment plant that would remove a minimum of 85 percent of the BOD from sewage originating in Easton, and to modify the combined sewers to prevent dry-weather discharge of sewage to the rivers. To construct the plant, the City of Easton Authority was created. Bids for construction were received in March, 1950, and construction began in April, 1951. The plant was completed in October, 1952, at a total construction cost of $1,491,776. It was financed by a revenue bond issue of $1,700,000. The Authority will lease the plant to the city which will operate and maintain it. The lease provides for payment by the city of annual rentals, over a period of 35 years, sufficient to cover all debt service requirements. To meet these payments, the city is now collecting sewer rentals in the amount of 60 percent of the water bill. Minimum collections from the Borough of Wilson will amount to $14,000 annually.



● **SCHEMATIC flow diagram of the Easton plant, based on an average flow of 5 MGD.**

The plant is designed to handle an average flow of 5 mgd based on a design population of 50,000 persons. However, for hydraulic design and maximum capacity of pumping units, a peak ratio of $2\frac{1}{2}$ times the average flow was adopted. The plant is therefore capable of treating storm flows up to 12.5 mgd, which will take care of the initial flushings from the combined sewers. Sewage flow in excess of this 12.5 mgd rate will be sufficiently dilute to dis-

charge directly into the rivers untreated.

All sanitary sewage originating in the City of Easton and the Borough of Wilson reaches the main pumping station at the site of the old treatment plant. From there it is pumped through a 24-inch force main approximately 3,000 ft. to the new treatment plant by means of new Peerless variable speed, raw sewage pumps. The two old pumps compartments, which for single-stage operation are merged into one by means of sluice gates. Sewage is pumped from the well to Diversion Box 2 by various interchangeable combinations of one to four Peerless Hydrafoil Pumps, each rated at 7.5 mgd.

From Diversion Box 2, the sewage flows by gravity to either or both of the trickling filters. These filters, each 160 ft. in diameter, have an average depth of 4.4 ft. and are designed for a loading of 1.46 lbs. BOD/cu.yd. or 2,350 lbs. BOD per acre ft. The overall plant is expected to handle a total BOD load of 14,600 lbs. per day. To provide ventilation and drainage, the underdrainage system is constructed with the two-piece type filter blocks furnished by Industrial Materials Co. Each rotary distributor has four double compartment arms capable of distributing a minimum flow of 3.5 mgd and a maximum flow of 12.0 mgd over the stone bed. These were furnished by Dorr Co.

The filter effluent flows by gravity to Diversion Box 3 where it is split to two final clarifiers which are the same size and design as the primaries. From the final clarifiers, the flow is split three ways: the underflow or secondary sludge is returned to Diversion Box 1 ahead of the primary clarifiers; the launder is returned to the recirculation well; and the overflow is chlorinated and goes to the chlorine contact tank before discharge to the Delaware.

Sludge collected in the primary clarifiers is drawn off into an inspection well from which it is pumped by two Carter duplex plunger pumps to the primary digester. This digester is equipped with a fixed cover and a propeller type mixer. Supernatant is automatically drawn off to the secondary digester which is equipped with a floating gasholder capable of storing 16,000

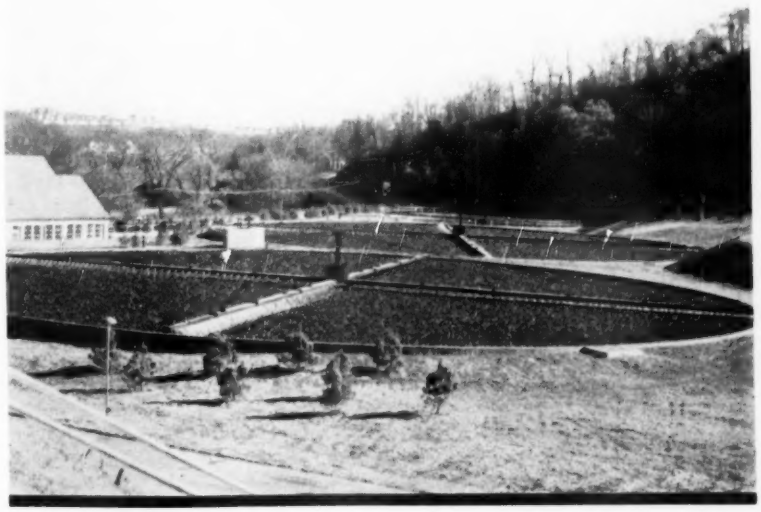
(*Continued on page* 104)

● **THAT ATTRACTIVE building in the background is the control house, not a private home. Grounds are landscaped to offer pleasing appearance from adjacent highway.**

in the original main pumping station, which were to be used as supplementary or stand-by pumps, will be replaced in the near future with new units.

At the new plant the sewage passes through two 25-inch Chicago comminutors and then flows through a Dorr Detritor 18 ft. square for grit removal. Each unit is provided with an emergency bypass with bar screen so that either may be taken out of service for cleaning or repairs, and excess flows may be screened.

The Detritor effluent is discharged to Diversion Box 1, which splits the flow between two 100-ft. diam. circular clarifiers with Dorr mechanisms. These tanks provide a surface settling rate of 635 gal./sq.ft./day and a detention period of 2.5 hrs. based on an average flow of 5 mgd, plus a recirculated flow of 5 mgd. The settled effluent is returned to the recirculation wet well in the control building by Peerless pumps. The wet well is divided into two



● **BIOFILTERS, designed for 1.46 lb./c.y. loading, are each 160 feet in diameter.**

COMMUNITY DEVELOPMENT

C. E. WRIGHT

DURING the past two years the town of Dunellon, Fla., (population about 1100) has served as a guinea pig in a community development program sponsored by the Florida Power Corp., St. Petersburg. Dunellon's problem was this: For more than a decade it had barely held its own in all-year population despite the fact that Florida as a whole had gained 46 percent and cities such as Miami, Fort Lauderdale, St. Petersburg and some others had almost doubled in size. Dunellon's location is not unfavorable; it is a short distance from the Gulf of Mexico; is surrounded by lakes and rivers; is six miles from Rainbow Springs, one of Florida's famous attractions, which is visited by hundreds of thousands every year; and is in the heart of a phosphate and limerock mining area.

But, despite all these advantages, Dunellon was not growing, it was actually slipping. In 1951 the Dunellon folks decided to see what could be done about it. They called in the Florida Power Corp. which shortly before had instituted a community development department, headed by Robert H. Giedd, manager, and Mark Wheeler, assistant. The Florida Power Corp. is one of several power companies throughout the South that have been assisting local communities in solving their problems of town and city planning during recent years.

Although Dunellon was the first town selected by Florida Power Corp. in its community development program, others have followed in rapid succession. These include Trenton, Mayo, Mascotte, Groveland, Jasper, Clermont, Monteverde, Minneola, Wildwood and Brooksville. A'l are small communities located in the western and northern sections of the state.

● **M. B. LOWE, Chairman of the Dunellon Improvement Association.**

Here is how the plan works in a town such as Dunellon: The Florida Power Corp. holds a series of clinics, usually ten or a dozen, with various groups of the townspeople, who are told how to go about starting a program of community development. By the time these clinics are concluded at least 15 or 20 per cent of the townspeople have attended and have expressed their views by card polls as to what the town needs most. Responsibility for arranging these clinics and the resultant programs is placed in the hands of some civic organizations such as the Chamber of Commerce, Rotary Club, Lions Club or Kiwanis.

"Experience has proven," says the Florida Power Corp. "that the best results are obtained from these clinics through the formation of a local general improvement committee. This should be under the direction of an outstanding citizen whose ability to coordinate the leaders of business, civic and other groups is recognized by all classes of citizens. There are many people willing to work for a better community who will respond to good leadership, and as many of these as possible should be assigned to the various committees. The number of committees will be determined by the number of projects undertaken. People are willing to work for a better home town when asked to do so."

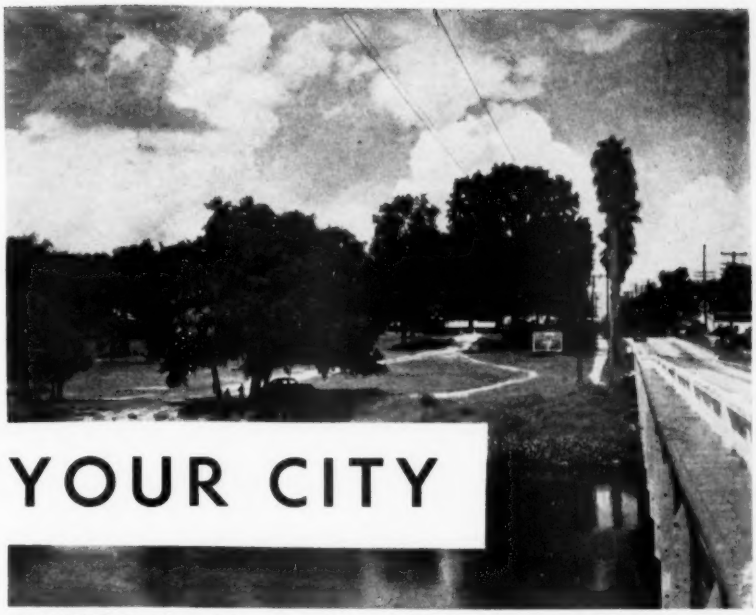
Subjects Covered

Subjects covered in the clinical surveys include beautification, recreational facilities, hospital facilities, school improvements, industrial development, water supply improvement, street and sidewalk betterments, tourist attractions and accommodations, housing development, municipal service improvements, postal service, parking and traffic, planning and zoning, a farmers market, telephone facilities, a public library, fire fighting facilities and advertising the community.

The first part of the program is to arouse a community spirit. Next is to find out from the citizens themselves what the town needs most. In some towns the suggested improvements go beyond the amount of money available in the municipal treasury, but money has been raised by barbecues, bingo games and other such activities, many of which are sponsored by the women.

Dunellon, for example, during the past year has succeeded in getting these things done: A city-owned lot bordering on the Blue River was cleared. A seawall was built and the area filled with white sand to make a nice bathing area. For the colored residents another beach was built, a road put in and a summer rec-

reational program inaugurated. An intensive "clean up and paint up" campaign was instituted. Street parkways and vacant lots are now kept clean. Beautification work is still going on throughout the town. A trailer park was built on city-owned property with capacity for 56 trailers and a fishing dock was built. New street lights were added; the City Hall was renovated; a new fire truck was purchased; roads and streets were improved; sidewalks laid; and welcome signs erected. A new chamber of commerce was organized, and its first act was to set aside $1500 for advertising. With one program completed, Dunellon set out upon another one, the objectives of which are a new public library; a cafeteria for a new colored school; the straightening of US Highway 41 through the center of town; additional housing facilities; erection of street markers; and beautification of the approaches to the town.



● **PUBLIC beach, at left, and trailer park, above, are among new improvements.**

CAN HELP YOUR CITY

The Wildwood Program

At Wildwood, women's committees raised nearly $3000 by various affairs. The Wildwood program is one of the latest to get started. Its clinics were held in April and May of last year and developed a number of projects on which work is now being done. When the people of the town were given an opportunity, though the clinics, to express their views as to what the town needed most, there were many worthwhile suggestions that became the focal points for subsequent action. Almost any town that has not had an organized community development program would find similar things that need to be done. Here, for example, are some of the suggestions that came from citizens of Wildwood:

Recreational Facilities.—Rehabilitate old swimming pool at an estimated cost of $5000; build a playground for children and a recreation center for adults on Lake Melinda, a neglected lake bordering on the town's main street; provide a civic center for all citizens; obtain better selection of supervision personnel for both educational and recreational facilities.

Municipal Affairs.—Install water treatment and better telephone facilities; provide a new city jail and put police officers in uniform; reorganize and strengthen the fire department; improve streets and sidewalks; expand sewerage system and improve trash and garbage disposal.

School Improvements. — A new high school, a school gymnasium, better rest rooms in the schools, repainting of school buildings and better educational and recreational facilities for school children were among the suggestions.

Industrial Development.—A committee of interested citizens to bring industries into the town was proposed.

Public Health and Safety. — A small hospital and health clinic facilities were stated to be badly needed; a civic center with all organizations working together instead of each one trying to go it alone and a welcoming committee to greet new people coming to town were suggested.

Streets and Sidewalks. — More sidewalks needed throughout the town; streets should be numbered and street markers placed at corners.

A serious need in most small communities, the Florida Power Corp. has found, is a planning and zoning ordinance to preserve orderliness in business development on main thoroughfares. In some towns there has been an overcrowding of gasoline stations in what should be the best areas for shopping. On some main streets vacant lots, held by investors who don't care about selling, has retarded the systematic development of business areas. An agent of the Federal Housing Administration has been brought into some towns where new housing facilities are an urgent need, and some idle local capital has been brought out of hiding as a means of assisting in local development of business places and homes.

Industrial development of small communities must be preceded by community development programs. This is one of the things that the planning experts of the Florida Power Corp. point out to local citizens. The seeker of a factory location usually scans the facilities which a town can offer to his workers and their children, such as good housing facilities, adequate public utilities, good schools, recreational facilities and the like. Without these things one town is likely to be passed by for another that has them. Thus, the Florida Power Corp. places community development first, although it also has an industrial development department to aid towns and cities in its territory, which embraces a substantial part of Florida and southern Georgia.

● **SIGNS welcome incoming visitors.**

PRACTICAL HIGHWAY MAINTENANCE EQUIPMENT

E. L. SCHMIDT,
Secretary, Pennsylvania Department of Highways

A RECENT survey of improvised equipment, developed by the maintenance forces of the Pennsylvania Department of Highways, reveals that wide varieties of labor and time-saving devices have been placed in practical use. Some of these have been manufactured from salvaged materials at little cost, and they represent a great expenditure of ingenuity, resourcefulness and skill by the men in the field, who are constantly striving for easier and better methods of performing formerly laborious and unwieldly tasks.

Next to their ability to make mechanical equipment that never existed before, is their resourcefulness in adapting standard equipment to other than intended use. But it is the field of experimental equipment that the maintenance men display their greatest ingenuity in devising equipment that will save both time and labor. This article will describe such equipment.

We have improvised a dipping vat in which paint is removed chemically from signs. This is built of one-eighth inch steel plate, and is three feet long, three feet deep and thirteen inches wide. The cover is hinged and angle iron supports are placed on the inside to within two inches of the top, centered in each side. From these extend one-half inch pipe on which the signs are hung. Twenty-four standard signs may be placed in the chemical and from two to eight hours later the old paint is removed with water.

A small aggregate dryer consists of a 10-foot section of 18-inch corrugated metal pipe, mounted on a salvaged heating kettle carriage. Five baffles within the pipe and a circular track on the outside, which runs in contact with small wheel casters mounted on the carriage, comprise the machine. A V-type belt powered by a one-half horsepower air-cooled engine revolves the pipe, one end of which is elevated to facilitate passage of the aggregate. Kerosene or gas torches are directed into the pipe and 40 to 60 tons of aggregate, depending upon the volume of surface moisture, are processed in a day. The dry aggregate is fed into the driers direct from the truck and, in turn, into a concrete or bituminous mixer.

Patching and Surfacing

Skin patching is one of the most widespread, as well as important,

● CENTRAL mixing plant setup, with aggregate dryer in background.

activities of Pennsylvania's maintenance forces. Here the men have come through with a device that fits the generally used patch widths. The distributor bar on a 600-gallon distributor is divided into varying sections. The bar is divided into one one-foot section; two two-foot sections; and one two and one-half foot section. Five shut-off valves are controlled by an operator, who sits on the seat installed on the rear of the equipment. Thus variable width applications are secured as desired for any given situation. Any one or more sections of the bar can be operated as required.

Versatile distribution of stone chips has been obtained by cutting the sliding gate of a tail gate chip spreader into four sections. There are one one-foot, two two-foot and one two-foot, four-inch sections. Each section is equipped with an individual lever for opening and closing so that any one or more may be operated independently. The bottom plate was narrowed to fit the Department truck which is used in conjunction with a 600-gallon distributor for skin patching operations. This spreader has also been used effectively to spread aggregates in the surface treatment of widenings and uneven widths of pavement.

In order to obtain an economical unit for heating bituminous material used in conjunction with the Department's 600-gallon distributor, a 500-gallon water tank was mounted on the chassis of a condemned air compressor. A four-inch pipe heating coil was welded on the inside and a thermometer inserted in the side. The material is heated by a gas or kerosene burner directed into the heating coil pipe. Under normal conditions this brings the material to application temperature in about one hour. This unit is also used when mixing patching material mechanically at a central location where it permits continuous operation, thus eliminating extra cost and delays encountered when two 50-gallon heating kettles are used.

To eliminate the awkward handling of flags for the protection of newly painted traffic lines, a flag chute was built of tin. It is equipped with strap iron hooks which permit mounting on any truck. The device has been quite successful in feeding sufficient flags down to the employee who is placing them.

Another innovation is a barrel steaming arrangement that can clean three barrels simultaneously with one heater instead of one heater to the barrel. Each steam line is controlled by a valve which enables manual control so that constant operation may be maintained. It has been estimated a 60% time gain in the operation has been secured.

Safety is also given considerable attention. A garage foreman has built a safety rail across the rear of a cinder truck, and the truck is also equipped with a lighting system for protection of the occupants as well as approaching motorists. Power

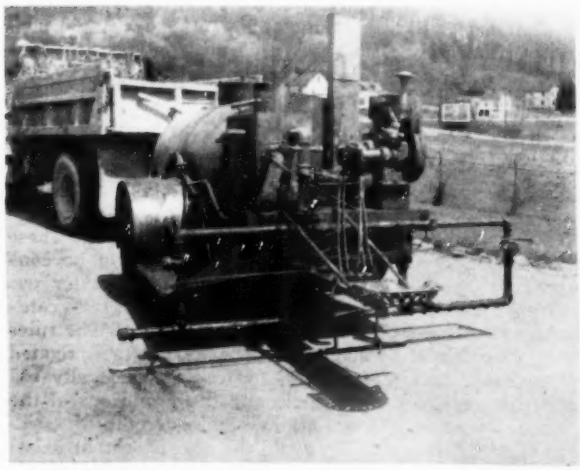
(*Continued on page* 103)

● **DIPPING VAT** for chemical removal of paint from signs. Tank holds twenty-four standard signs.

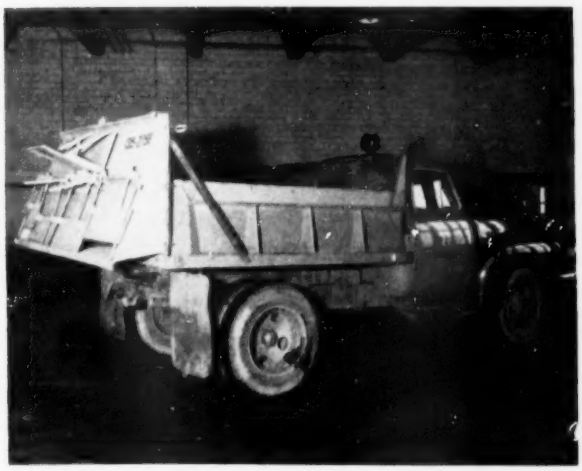
● **AGGREGATE** dryer consists of 10-ft. section of corrugated pipe; drys 40 to 60 tons of aggregate per day.

● **CHUTE** at side of truck simplifies handling flags used for protection of newly painted traffic markings.

● **SAFETY RAIL** built across the rear of cinder truck is equipped with lights to warn approaching motorists.



● **DISTRIBUTOR** bar fitted with valves permits use of sections of variable width on skin patching operations.



● **STONE SPREADING** widths are controlled by using one or more sliding gates in the tail gate chip spreader.

STREAM CLASSIFICATION

JOSEPH C. FREDERICK

THE growing realization that the progressive impairment of the nation's water resources is destroying an important economic asset has resulted in the passage of remedial legislation by many states. These statutes have the general objective of preventing any increase in the pollution of our lakes or streams, of reclaiming waters that have become grossly polluted, and of protecting water sources that have escaped defilement. The coordinated development and best utilization of the water resources of a region necessitates legislative and administrative action on local, state, and federal levels.

On the state level, administrative control is lodged in State Health Departments, Water Pollution Control Boards, or special commissions. Irrespective of the agency, what is of extreme importance is the judicious application of regulatory authority and impartial administration of rules and regulations. Consequently, the methods and procedures of applying restraints, with respect to water use, are of special significance. Considerable benefit may be derived from the experience during the past thirty years of the application of similar regulatory legislation to the use of land and more recently to the restrictive use of air spaces, generally referred to as zoning.

In each of these fields, the basic authority for control is derived from enabling legislation enacted under the police power of the state to legislate in the public interest for the public safety, health, morals and general welfare. In a similar manner, statutory authority is vested in regulatory agencies for the control of water use. After the grant of authority, the problem arises as to the best and most effective means of exercising administrative control over the function.

To this end the utilization of the zoning concept with various control mechanisms will provide efficacious administrative machinery. At the present time, the term zoning is used rather loosely in the water supply and sewage treatment field. The system of designating waters as class A, B or C waters is not zoning. Zoning is nothing more than the division of an area—land or water—

● **ONONDAGA LAKE, near Syracuse, N. Y., represents a combination of industrial development and recreational use. All potential uses must be considered.**

into a number of segments or zones with *differing regulations* applicable to each *different type of zone*. The area is physically laid out on a map with boundary lines indicating the extent of each zone.

Administrative Considerations

Emphasis in the sanitary engineering field has been principally upon the classification of streams and standards of quality that should be specified for various usages. Regardless of the technical perfection of the classification—standards system developed, what is of extreme importance is the translation of such a system into an effective administrative procedure. The scope, form, and content of water use zoning regulations have received little discussion in the literature. Furthermore, the development of rules of conduct for the equitable application of such administrative regulations has received scant attention. Analysis indicates that certain basic provisions are essential in all administrative regulations dealing with water use. These may be divided into two basic categories.

One group consists of sections relating to the enactment and interpretation of the regulations and to matters of an administrative or procedural character, such as the purpose of the regulations, their promulgation into law, definitions of terms, issuing of permits, enforcement, appeals and providing for amendments and changes. These provisions constitute the administrative portion of the regulations.

The second basic category includes the regulations pertaining to each of the zones, or supplementary regulations applicable to all of them. These provisions form what may be considered the body of the water use zoning regulations. The two categories are interdependent. The rules and regulations must be promulgated into law, the use zones legally established, and the provisions of the regulations administered.

To avoid the confusion that exists among the various states as a result of lack of uniformity in nomencla-

AND WATER USE ZONING

of water supply would be termed water supply zones. Waters that are to be devoted to recreational uses would be termed recreational zones. There may be differentiation between zones of the same general use terminology based upon the degree of restrictiveness imposed by the quality standards which the waters must meet.

The zones may be designated by an identifying letter or a letter and number, followed by a descriptive term which more specifically indicates the dominant use to which the waters may be devoted. For example, there may be two water supply zones, so designated because the best usages of the waters are for domestic water supply purposes. The waters of one zone may be safe for drinking water purposes requiring only disinfection. The waters of the second zone to be

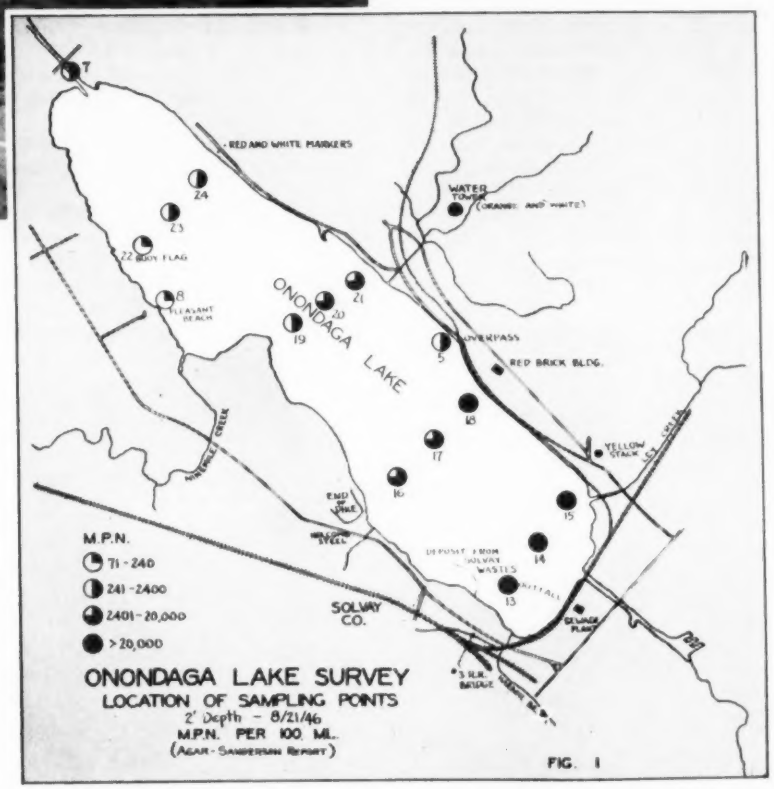


FIG. 1

● **WATER SAMPLING survey shows concentrations of coliform bacteria.**

ture relating to water classes, it is proposed to designate stream zones in accordance with the dominant or best usage for which the waters are designated. On this basis, waters that are designated as a source utilized for human consumption may require purification to the extent of coagulation and filtration. The zones are designated as follows:

WS 1 Zone: Water Supply Zone Domestic

WS 2 Zone: Water Supply Zone, Domestic

Other zone designations might relate to bathing, boating or shellfish raising and would be designated as recreation and commercial zones as follows:

R 1 Zone: Recreation Zone, Bathing.

R 2 Zone: Recreation Zone, Boating.

C 1 Zone: Commercial Zone, Shellfish Raising.

Zone Regulations

In stream zoning, the highest or best uses to which the waters are to be put are designated. The extent of treatment, if any, to which the waters may be subjected to be satisfactorily utilized for the specified purposes is indicated, and quality standards that the waters must meet are imposed.

These zoning specifications are applied by assigning a class designation to the waters and stating that waters within the zone shall comply with the quality standards for that class of waters. Stream classes and zone designations must not be confused. A zone has area, a stream class does not, but indicates the water quality to be maintained.

The nomenclature used in designating stream classes in existing state regulations is either by letter or numeral. Waters are designated as Class AA, A, B, C, D, etc. or Class I, II, III, IV. This lack of uniformity in designation is confusing to industrial organizations and engineers that have interstate operations. It is believed that the numerals should be used with zone designations and the letters are more applicable and appropriate for class identification. Furthermore, some standardization of letters should be made. Class A waters in one state are equivalent to Class AA waters in another.

The first type of zone is one in which the best usage of the waters is for domestic water supply. This zone following the recommended method of designation is a WS 1 zone: Water Supply, Domestic. The quality standards which are considered applicable to all WS 1 zones are those specified for Class A waters as given in the illustration below.

The second type of zone illustrated is one in which bathing is

(*Continued on page* 115)

Industrial Wastes Influence MUNICIPAL PLANT DESIGN

RALPH E. MONSON,

City Engineer, Rochester, Minn.

WITH formal ceremonies, Rochester, Minn., celebrated the opening of its new sewage treatment plant in January, 1953. In various stages of initiation, discussion and progress since 1944, construction was started in the fall of 1950 and completed approximately two years later. Cost was approximately two million dollars; and, also, a large additional sum was spent on a trunk sewer and on storm and relief sewers throughout the city. The 1951 bond issue of $2,800,000 will be serviced and retired by sewer rentals from all sewer users.

Plant Units

The plant units include fine screens to provide primary treatment, followed by high rate trickling filters and final settling tanks. A bar screen and grit removal unit precede the screen and chlorination is the final treatment. The new trunk sewer is 48 ins. in diameter, of reinforced concrete pipe furnished by the Elk River Concrete Products Co. Joints are Tylox rubber gaskets, the remaining annular space being filled with Atlastic joint compound. The sewer follows the general alinement of the Zumbro River. Angles in the sewer lines are constructed as curves in the pipe line, using specially cast bends. Manholes are of reinforced concrete.

The main control building is the center of the plant operating system. Sewage flows by gravity to the subbasement, where it passes through a Parshall flume, a mechanically cleaned bar screen, and a grit collection and washing mechanism. The screen and grit washing equipment were furnished by Link-Belt. Screenings are ground and returned to the sewage flow.

From the primary wet well, the sewage is lifted by a battery of five Fairbanks-Morse sewage pumps to the fine screens, which are located on an upper level of the screen house. The pumps, which vary in capacity from 1300 to 5500 gpm, are arranged to operate in sequence automatically, with adjustment to the volume of sewage to be handled. The fine screens are of the North rotary type; each is 5 ft. in diameter and 10 ft. long; mesh is 10 to the inch. These screens are used in lieu of primary settling tanks. One factor in their use was the presence of a considerable amount of milk wastes in the sewage. The much shorter retention period, as compared to conventional settling tanks, lessens the possibility of the sewage becoming septic.

Filter Details

From the screens the sewage flows by gravity to four high-rate trickling filters of the Aero-filter type. These are 80 ft. in diameter and 6 ft. deep, with Yeomans distributors. The effluent from the filters is collected in TFFI specification underdrains and discharged to the settling tanks adjacent to the control building. Recirculation facilities are provided, with recirculation pumps located in the main control building basement. The final effluent is chlorinated. The settling tank sludge removal equipment is Chain Belt and the chlorinators are Wallace & Tiernan.

Sludge is collected from the fine screens and from the settling tanks and pumped to a pair of digesters, each with a capacity of 250,000 gallons. These are provided with gas collection devices and external sludge heaters, and are of the Pacific Flush Tank type. The digested sludge is dewatered on two Eimco vacuum sludge filters, each 8 ft. in diameter and 8 ft. long, providing a total of about 400 sq. ft. It is planned to dispose of the sludge cake for use as a soil conditioner. Water for the plant comes from a deep well, constructed by McCarthy Well Co. This water supply is designed as a combined pressure and gravity system. The sewage treatment plant has a complete laboratory. Design provided for a flow of 7 mgd, and the layout is so planned that additions can be made if the growth of the city requires it.

The consulting engineers for the work were Toltz, King & Day, Inc., of St. Paul. General contractors for the plant were Feller & Pagenhart of Rochester; and for the trunk sewer the contractor was Carlisle G. Fraser of St. Paul and Rochester.

● **AERIAL VIEW of the new sewage treatment plant at Rochester, Minn. The plant is designed for a flow of 7 MGD, with provision for new units if needed.**

● **CREW INSTALLS** another section of liner plates as the tunneling progresses. Each section is 18 inches wide.

● **MUCKING** machine extends beneath the working platform to dig out the bench and load the excavated material.

STEEL LINER PLATES SIMPLIFY TUNNEL CONSTRUCTION

A 14 - FOOT horseshoe - shaped tunnel is being driven beneath one of the busiest districts in the Metropolitan Los Angeles area by G. E. Kerns Construction Company of Long Beach, Calif. The tunnel will house a drain 5,000 feet long to carry storm water from the downtown area.

With open trenching out of the question because of exceedingly heavy automobile traffic throughout the day, an effective tunneling procedure was the only logical method of completing the project. At the upper end, the tunnel lies under two streets bordering the Los Angeles Union Passenger Terminal. It passes under 22 railroad tracks before reaching its discharge point at the concrete-lined channel of the Los Angeles River. For the most part, the crown of the tunnel is 15 to 18 ft. below ground surface.

Since the alluvial deposits pierced by the tunnel must be totally supported, the contractor uses Armco steel liner plates for arch and sidewall construction. On this job the liner actually serves as a building tool, and makes it possible to construct a reinforced concrete drain within the tunnel.

Kerns Construction Company uses a combination of the needle beam and bench cut methods to advance the tunnel. Workmen dig out the upper 6 feet of the face with hand tools, leaving a bench behind them. Mucking machines follow to dig out the bench as work progresses.

The liner plates are only 18 inches wide so a single workman can handle the units. Installation is also simplified because plates can be quickly fitted into place. No more than 18 inches is dug ahead at a time, the gravel above being held in place by short header boards, made of 1 x 6-inch timbers, and excelsior dry-packed into openings. Narrow widths of the plates are also an aid when unstable material is encountered, since only a small section need be exposed at one time.

"Using corrugated steel liner plates is a big advantage over rib section construction," says contractor George E. Kerns. "By excavating only 18 inches before installation of the supporting panel, we're able to make rapid progress with no danger of losing any dirt. As a general rule, three shifts a day work the upper heading and one shift works on the tunnel grade. We advance about 20 feet per day with this method."

Placing the Lining

After the arch face has been advanced 18 inches at the crown a section of liner is bolted to the preceding panel. Digging continues by hand down the spring line and other sections of liner plate are attached. With longitudinal bolts already in position workmen need only place the ⅝-inch bolts through circumferential flanges and tighten with a hand wrench. Soil then is dug out to receive the next liner.

While working on the upper section of the arch, excavated material is shoveled back over the bench and picked up by a mucking machine on the tunnel grade. Support for the arch is provided by two needle beams extending over the bench from a framework of 12 x 12-inch timbers set up over the tracks. Screw jacks are inserted between the needle beams and the arch portion of the steel liner plate.

Arch supports are removed as liners are inserted to timber footings on either side of the tunnel grade.

Work progresses more swiftly as the bench is cleared out 18 inches at a time. Excelsior is also used here to hold back any free-flowing material. The crew bolts on liner plates down both sides at once, lining and plumbing the walls as they go along.

Standard mine track is laid as the shaft advances. The mucking machine stands on this track and is also used for removal of excavated material. An electric locomotive brings muck to a vertical shaft where it is lifted to the surface by a crane equipped with a clamshell bucket.

The 20 x 20-foot vertical access shaft is located in a blocked-off section of Lyons Street just north of Aliso, about midway between Alameda Street and the river. From Alameda to the discharge outlet there will be 3285 feet of tunnel. The remainder of the tunnel leading under Alameda Street is slightly smaller in size, measuring 11 feet 4 inches high, and is approximately 1500 feet long.

The contractor originally planned to work two headings, in both directions from the access shaft. Difficulty of obtaining qualified supervisory personnel forced him to abandon this plan and concentrate on one heading. A second access shaft will be sunk at the intersection of Alameda and Aliso Streets to carry the work forward from that point. Several 90-degree turns were necessary as the tunnel follows street lines.

Tunneling has proceeded on schedule through the mixture of clay, sand, gravel and silt so far encountered. Only a small amount of ground water is present. Although favorable conditions have been the rule to date, with the shaft more than half driven, there was considerable difficulty in opening the outlet portal at the river. Large rock had been placed there years ago to serve as riprap, and these were subsequently covered by the railroad tracks. Blasting could not be used for removing the rock because of danger to the tracks. Rocks therefore were split by the plug and feather method to sizes that could be handled. Another complication in the same tunnel section developed when it was discovered that an existing 42-inch concrete pipe storm drain did not lie where surveys indicated it should be. The new tunnel had to be realigned to avoid the drain.

Construction of the concrete lining is now underway. First step is pouring the invert slab which slopes from each side toward the center, where it is 18 inches thick. Key sections along the sides form footing blocks for arch walls.

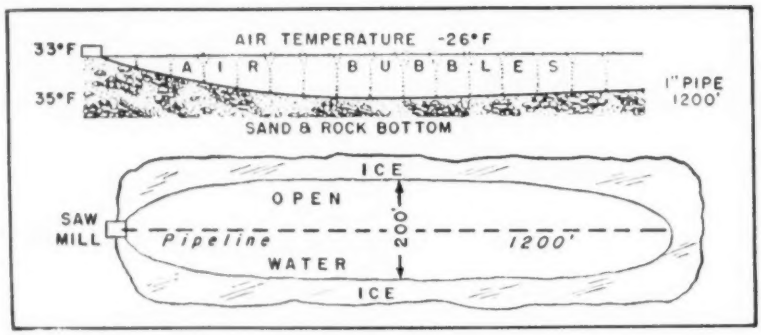
The concrete lining will have an inside diameter of 12 feet, with walls 12½ inches thick at the crown and gradually increasing in thickness to the invert. The Armco corrugated steel liner plates serve as the outside form for pouring the walls. They will remain in place after the tunnel is completed. Inside forms are, of course, necessary.

After reinforcing steel for the walls is in place, collapsible steel inner forms are erected and pouring commences. The inner forms are in 8-foot lengths which telescope onto a conveyor in the center so that a form being stripped may pass through the next section still in place. Small pipe openings in the roof of the inside concrete form permit pumping the final concrete into place. No concrete is pumped more than 500 feet from where it is discharged by transit-mix trucks at ground level.

Close cooperation between G. E. Kerns Construction Company and the city of Los Angeles Bureau of Engineering indicates that, barring unforeseeable complications, the tunnel will be completed with maximum speed and efficiency. The project was designed in the Storm Drain Division office of City Engineer Lloyd Aldrich.

Supervising construction for the city under the Bureau of Contract Administration is A. J. Sutcliffe, resident inspector; and G. G. Thomas, excavation inspector. A. F. Wright is city surveyor on the project. Fred Kerns is project manager for the contractor and M. G. Holwick is serving as superintendent. Other personnel include Lloyd McNeece, master mechanic, and Eddy Maffitt, engineer.

COMPRESSED AIR KEEPS POND CLEAR OF ICE IN VERY COLD WEATHER



● **LAYOUT of piping for preventing ice formation in lake near log loading slip in a cold-weather area.**

BUBBLES of compressed air have been used successfully to keep a log pond from freezing over, according to the Canada Lumberman. Warren Brown of Brown's Tie & Lumber Co., McCall, Idaho, bored 1/32-inch holes at intervals of 80 feet in 1-inch pipe and laid 1200 ft. of the pipe out from the log loading slip. The far end of the pipe was capped and the land end connected with a 105-cfm air compressor. Air was turned on before freezing weather set in. As the bubbles rose from the pipe, which was on the bottom of the pond, 20 to 110 ft. below water surface, they fanned out and prevented freezing. Even with a temperature of 26° below zero, an area 200 ft. wide and 1200 ft. long remained unfrozen throughout the working season.

This method has been used before, so that it was not original with Mr. Brown, but it may have many applications in cold climates. Although agitation due to the ascending air bubbles is a factor in preventing freezing, the primary cause is the turnover of the warmer lower layers of water. The greatest density of water occurs at about 39°F. at which temperature, the water sinks to the bottom of the pond. The air bubbles bring this relatively warm layer to the surface; colder water then sinks to the bottom and is warmed. It is this circulatory movement that prevents freezing, since the surface water never quite reaches 32°F.

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DONALD F. HERRICK, *Executive Director*

State Legislatures Consider Action on Many Measures That Affect Public Works Engineering

Regular legislative sessions are being held in every state this year except in Kentucky, Mississippi, Louisiana and Virginia. All sessions have convened except in Florida where the legislative session will begin next month. Current reports coming to the attention of the APWA headquarters staff indicate that many public works measures have been proposed for the consideration of the state legislative bodies throughout the country. In Utah the Legislature approved a bill increasing the gasoline tax from 5 to 6c per gallon: such increases are also being sought in 15 other states, including—Ohio, Pennsylvania, New Mexico, Maryland, California, Indiana, Iowa, Minnesota, Connecticut, Texas, Nebraska, Montana, North and South Dakota and Wisconsin. Legislation has been introduced in the following states to extend previously enacted "temporary increases" in gasoline taxes:— Colorado, Kansas, Nevada, South Carolina and Oklahoma. New truck taxes have also been proposed in Colorado, Indiana, Maine, New Jersey, Maryland, Minnesota, Arkansas, Ohio, Idaho, Montana, Nebraska, South Dakota, West Virginia, Connecticut and California. Various forms of borrowing proposals have also been introduced to finance highway modernization programs in Idaho, Ohio, California, Delaware, Maryland, Washington, New Hampshire, Colorado and Oregon. In Tennessee a bill advocated by the Tennessee Municipal League and supported by the state administration is receiving favorable consideration and is expected to pass. It provides for the allocation of about $7 million per year from state collected gasoline taxes to cities for street improvements. Other states considering measures to provide new or increased allocations to political subdivisions from state collected motor vehicle revenues, include, Maine, Rhode Island, Idaho, Wisconsin, Utah, Connecticut and Indiana.

Our Apologies . . .

We are sure you spotted the error in our headline about the New Orleans Congress. It's the 1953 APWA Congress that will meet in New Orleans. We apologize for ourselves and for our printer.

Toll Roads and Parking Districts

New or broadened toll road construction is also being sought in

(*Continued on page* 89)

State Chairmen Meet

Four regional Conferences have just been held for the Association's State Chairmen. The Central Area meeting was held March 24 in Chicago. The second meeting was held for the Eastern Area in New York, March 26. The Southern Area meeting took place March 31 in Chattanooga, Tennessee, while the last meeting is to be held in Salt Lake City, Utah, April 21. These were "kick-off" meetings for the Associations Annual membership campaign. Every effort will be made during the next few months to enroll several hundred new members before the Public Works Congress and Equipment Show which will be held in New Orleans October 26-29.

NEW APWA MANUAL OUT SOON ON PERFORMANCE BUDGETING PRACTICE

A new manual on performance budgeting will soon be available for general distribution. The preparation and publication of this manual is a joint project of the American Public Works Association and the Municipal Finance Officers Association (MFOA). The pre-publication draft has been completed and is now being sent to the Committees of each organization for final review. The APWA Committee is headed by Richard Gallagher, Director of Public Works, San Diego, California. The manual was prepared under the direction of Frank Sherwood and other members of the staff of the School of Public Administration of the University of Southern California. It is, in part, based on the results of a comprehensive survey of current budget practices conducted several months ago under the sponsorship of the APWA and MFOA.

What Performance Budgeting Is

The Survey data, along with a thorough review of publications of the past fifteen years on budgeting provide significant clues as to the current trends and indicate those areas where improvements must be sought. Performance budgeting, which consists of the preparation, analysis and interpretation of the financial plan in terms of services and activity programs rather than the detailing of objects of disbursement, such as, personal services, supplies, etc., has proved to be quite practical in both large and small jurisdictions. It is expected that the wide-spread adoption of the uniform work units and terminology and the

(*Continued on page* 88)

Kelly Represents APWA on Traffic Committee

Association President Allan H. Rogers, of Garden City, New York, recently appointed Robert J. Kelly, Supt. of Parking of the City of Chicago to represent the APWA on a Joint Committee On Relief Of Urban Traffic Congestion and Parking Problems. Mr. Kelly replaces Mr. James L. Foley, former Chief, Bureau of Off-Street Parking, Department of Streets and Electricity, Chicago, who recently resigned to become associated with the J. E. Greiner Company, Consulting Engineers, Baltimore, Maryland.

The Joint Committee consists of representatives of the American Bar Association, Automotive Safety Foundation, Bureau of Public Roads, American Society of Civil Engineers, American Automobile Association and several other organizations. It is headed by Dean Jefferson B. Fordham of the University of Pennsylvania, and will study the organizational, legal and financial aspects of the automobile parking problem. Dr. David Levin of the Bureau of Public Roads is the Project Coordinator. The next meeting of the Joint Committee is tentatively scheduled for the latter part of April in Washington, D. C., at which time the work of several sub-committees will be reviewed. Because of the comprehensive nature of this study no publication date has as yet been announced.

A Suggestion

Each month special news items are included in this column to acquaint our readers with the activities and nature of services rendered by the APWA. Supplemental information concerning items appearing in this column is presented in the Association's Newsletter. Why not consider membership in this important Association? For full details—without obligation, address the Executive Director, 1313 East 60th Street, Chicago 37, Illinois.

150 Attend Meeting of Chicago Chapter

Chapter officers continue to report a growing interest in local chapter meetings which enable members and their guests to gather together and discuss problems of mutual interest. In most cases these meetings are well attended by municipal, county and state officials and many times by federal officials as well, thus providing excellent opportunities for the discussion of inter-governmental problems.

Manufacturers representatives, consulting engineers, contractors and officials from private utility companies frequently attend these chapter meetings which provide a common meeting ground for all persons interested in the public works field.

REPORTS OF SPECIAL INTEREST TO PUBLIC WORKS OFFICIALS

Reports are published from time to time by the Association on a wide variety of subjects of interest to public works officials. Special Reports published during the past five years cover such subjects as: The Scaling of Concrete Pavements—Causes and Cures: An Analysis of Sanitary Land Fill Operations; Bibliographies of Refuse Disposal Practices and of Field Engineering; A Study Report of Domestic Garbage Grinders; Controlling Roots In Sewers By Copper Sulfate; Snow and Ice Control In Cities Over 200,000 Population; Snow Removal Practices in Cities Under 200,000 Population; Requirements of Procurement Procedures, Bidding Forms, Specifications and Contracts Which Are Objectionable to Many Equipment Manufacturers; Recent Developments in Chlorination Practices; Survey On Personnel Practices, Wages and Salaries—Municipal Public Works Departments; An Evaluation of Household Food Waste Disposers; Pre-Calculation of The Annual Tonnage That A Refuse Incinerating Plant Can Burn; and Refuse Collection and Disposal Practices. These publications are available upon request at prices varying from one to three dollars per copy. Write for price list today. Members are entitled to a forty percent discount.

MOVIE OF THE MONTH:

"Asphalt—The Modern Pavement," a new 20 minute film showing uses and construction of various types of hot-mix asphalt surfaces. Scenes also show hot-mix plants in operation. Available for limited use outside Michigan. Write APWA for full details on how to borrow this interesting film.

Standard Specifications for Various Stages of Paving Construction Now Available from APWA

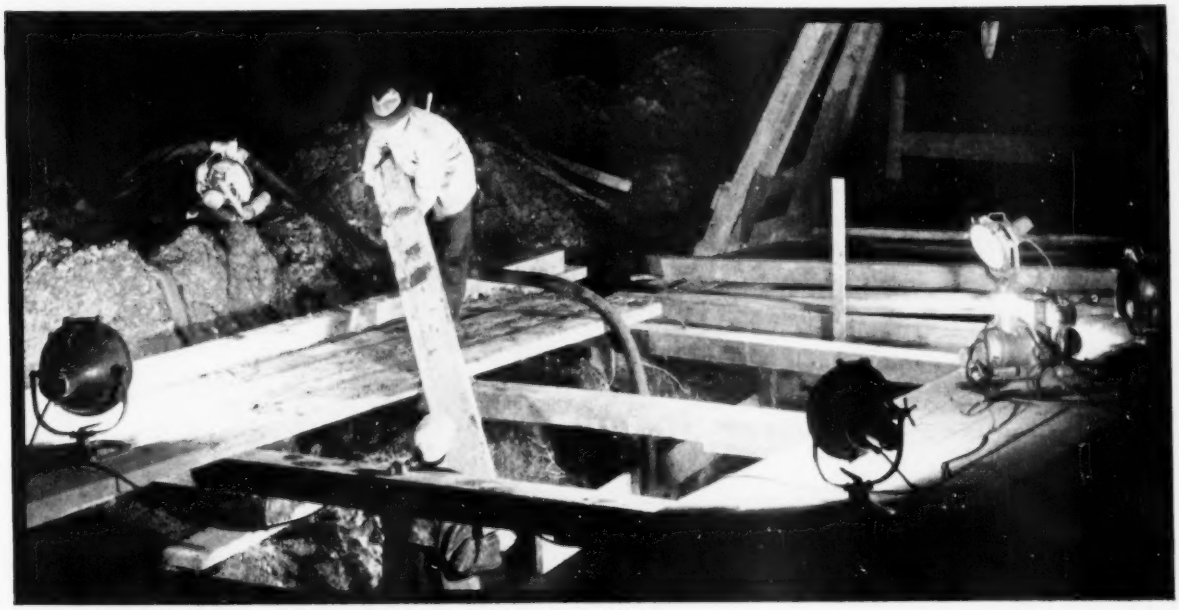
The APWA for many years has taken an active interest in the development of *Standard Specifications for Public Works Construction* so that they may serve as guides or models for the preparation of actual contract specifications. Responsibility for the preparation of the Standard Specifications has been assigned by the Association to a number of committees established for that purpose. Specifications are periodically examined by the committees in charge and revised whenever developments in materials or construction methods make such revisions desirable. The Association is also represented on committees of the American Standards Association and the American Society of Testing Materials who promulgate specifications for construction materials.

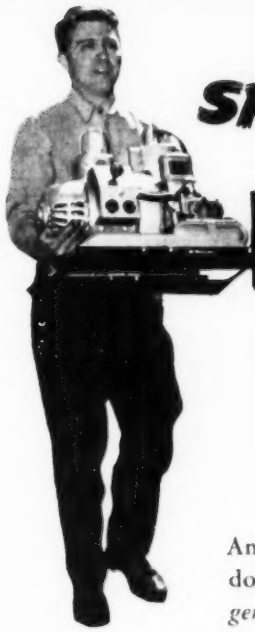
APWA Specifications currently available cover the following types of construction: Earth subgrade; Pavement Foundations of—new macadam, reconstructed macadam, portland cement concrete, asphaltic concrete, tar macadam (hot and cold penetration), reconstructed brick, block, or concrete pavement, and asphalt macadam. Pavements of—vitrified brick, stone block, portland cement concrete, sheet asphalt, bituminous macadam, asphaltic concrete, cold laid asphaltic concrete and sewers. Specifications for sidewalks, curbs and stabilized wearing courses have been prepared but are currently out of print. The price of a set of these specifications, complete with binder, is $10.00.

Budget Practices

(*Continued from page* 87)

budget procedures outlined in the manual will stimulate a desire for more efficient administration and a corresponding reduction in governmental costs since comparisons of costs between various jurisdictions could then be made on a relatively uniform basis.





SPEED UP NIGHT REPAIRS WITH HOMELITE CARRYABLE FLOODLIGHTING

Any repair job that has to be done at night is an *emergency* job, a job that has to be done *but fast.*

On these jobs, nothing helps better than floodlighting . . . bright, brilliant floodlighting. And nothing gives you this floodlighting faster, easier or at lower cost than a Homelite.

All you do is put your small, compact, easy-to-carry Homelite Generator where you need it. You start it, plug in your floodlamps or spotlights or even electric power tools, and your men are working under ideal conditions for not only speed but safety.

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State Legislatures

(Continued from page 87)

California, Delaware, Iowa, Kansas, Missouri, Nebraska, New York, Pennsylvania, Rhode Island, Wisconsin, Texas, Washington, Illinois and Connecticut. The Montana lawmakers recently approved a bill creating a new State Toll Bridge Authority. Toll bridge measures are also pending in California and Georgia.

Other significant legislative developments to date include a recommendation by a Legislative Committee in the State of Washington to pass legislation authorizing incorporated cities to establish vehicle parking districts with authority to levy assessments against property in the district and also to issue revenue bonds. A new law approved in Wyoming permits cities and towns to construct and provide off-street parking facilities. Similar legislative measures providing for new or broader laws of this nature are now pending in at least thirteen other states including: South Dakota, West Virginia, Maryland, Georgia, Connecticut, Indiana, Kansas, Maine, Wisconsin, New Mexico, Massachusetts, Nebraska, and North Carolina.

Legislation proposed in Utah would create a new State Water Pollution Control Board and provide for the classification of waters in that state. New measures affecting pollution abatement programs have also been proposed in other states including West Virginia, Pennsylvania, North Carolina and Kansas.

Sewage Treatment Plants

The Governor of Pennsylvania has called for the enactment of legislation to permit communities to build jointly sewage treatment plants. In Kansas the legislature is considering a bill which would give all cities of the first class the right to construct sewers and/or treatment plants outside the city limits for a distance up to five miles and charge the cost against benefited property owners.

Early reports indicate that legislation to prohibit the feeding of raw garbage to hogs has been introduced in Michigan, Kansas, Idaho and Indiana and is also being considered by a specially appointed legislative committee in California. New or modernized building codes are also expected to be presented for legislative consideration in Iowa, Kansas, Minnesota, North Carolina and Ohio.

Washington news

Presented in cooperation with the American Public Works Association and through the courtesy of the Washington Office of the American Municipal Association.

Congress Considers New Highway Measures

Although the Federal-aid Highway bill is not up for debate in this session of Congress there are many highway bills in the Federal hopper. The major highway bills in the Congress so far are: (1) The bill of Senators Magnuson (D-Wash.) and Kilgore (D-W.Va.) to authorize appropriations of the proceeds of all the automotive excise taxes for distribution to the states for highway purposes; (2) Bills by Dempsey (D-N.M.) and Patten (D-Ariz.) to increase the authorization of funds for the Federal-aid interstate highway system from $25 million to $225 million. (3) Other measures propose the creation of a Federal Super-highway authority or commission for a super-highway running from the Atlantic Ocean to the Pacific. About a dozen bills would provide for the construction of a North-South highway paralleling the Mississippi River. Most of these call for financing by Federal funds with the cost being amortized by tolls. (4) Two bills calling for a change in the legal use of Federal-aid highway funds are in the hopper. One would allow use of Federal-aid funds on the approaches to toll bridges and the other would allow the use of Federal-aid funds on toll roads.

A proposal, sponsored by the Governor's Conference, that the Federal government repeal the 2¢ tax on gasoline, turning this revenue source over to the states, is expected to be introduced in the Congress before the end of March. Strong support is expected for this proposal. Already memorials to Congress to repeal the Federal gasoline tax have been introduced in 22 state legislatures.

Reconstruction Finance Corporation

Senator Byrd has introduced a bill to abolish the RFC. However, the law authorizing the agency expires in June 1954. Washington insiders say that despite Byrd's bill and the support for the bill from Secretary of the Treasury Humphrey the big Government lending agency will be allowed to die a "natural" death upon the expiration of the law next year.

Social Security

Chances appear slim for the passage of legislation extending social security to State and municipal employees. Under terms of the present law such employees who are eligible for existing retirement systems are not eligible for Federal OASI coverage. The House Ways and Means Committee virtually killed changes in the law this year. The committee put the brakes on expansions of coverage by appointing a sub-committee to make a broad, deep digging study of the whole social security picture. Chairman Reed said he expected this study would preclude any legislative action this year on social security proposals.

Using Selma Chalk Rock for Road Surfacing

H. B. SMITH, JR.,
County Engineer, Livingston, Ala.

WE used a Wood pulverizer to crush Selma chalk. This chalk is a local material that requires plowing with a rooter and this brings the material out in large lumps that are very hard to crush. During the year we purchased the pulverizer and it really does an excellent job of crushing. We dump the chalk in windrows on the center line of the road; then we use a patrol and work from each side, cutting a little of the material on each trip. Then we put the pulverizer over it a couple of times and it does such a good job that the motor patrol can go back and reshape the surface.

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TROY, OHIO. One of two football stands, capacity 5,000 seats each. Note press box and enclosed underdeck area.

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In your present planning for improvement of spectator facilities for sports events in your municipality, you can be assisted greatly by the broad experience of Pittsburgh-Des Moines. We will be happy to counsel with you on your problems, and detail the time-proved adaptability of our unit-constructed Steel Deck Grandstands to every type of outdoor seating. Write today, and ask for your copy of our comprehensive Grandstand Brochure.

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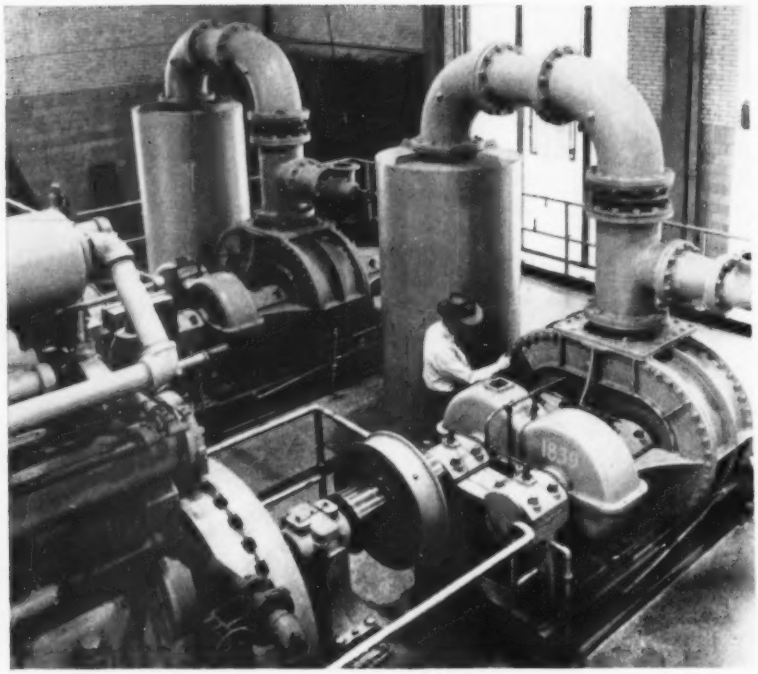

Recent installation of two R-C Rotary Positive Blowers in Northeast Sewage Treatment Plant. Capacity of each unit is 5,000 cfm.

CONSULT THE "Specialists" ON BLOWER PROBLEMS

One of the many reasons why Roots-Connersville Blowers are such prime favorites among sewage treatment engineers is their unquestioned reliability. In small plants, with only intermittent or part-time attendants, this is of prime importance. For installations handling large volumes, even a temporary breakdown could have serious results.

Another factor contributing to the popularity of R-C equipment is the *dual choice* provided by the exclusive *dual-ability line* of both Rotary Positive and Centrifugal designs. Because we build both, R-C Specialists have no prejudices—they can recommend whichever type is best suited to the specific job to be done.

The long-time, satisfactory performance of R-C installations comes from almost a century of specialized experience in handling air and gas. We have no other business—our time and facilities are 100% devoted to designing and building blowers, meters, gas pumps and related equipment. Much of this experience is in the sewage treatment field, in which we have more installations than any other company. So, when you have a problem of blowers, for new plants or for replacements, we suggest you call on the "Specialists" who are always at your service.

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Trenchers Do 8 Different Jobs on Building Project

A fleet of ten Cleveland trenchers are being used at Levittown, Pa., in maintaining the 200-home per week schedule laid down by the builders. These trenchers perform eight different operations. After the street lines have been laid out and rough grading is completed, the trenchers are used for digging water main trench. This is 3 ft. deep and 16 ins. wide. When this work is completed, the trenchers are used to cut the water service lines to the individual homes.

● **ROUGH plumbing trench for service lines. Note that house footings have already been poured.**

Three trenchers are constantly employed in digging footings for the houses. For each house about 150 feet of 36-inch deep trench is required for footings. The plumbing trench is dug after footing excavation is completed. Trenchers are also used for cutting a trench for the street lighting conduit. Larger, diesel powered units are used for digging the sewer line trenches. At one time, these trenchers were used to excavate for street curbing, but with the adoption of a different type of curb, this is no longer done. Small machines are used to dig the sewer service lines.

● **TRENCHES are being dug from houses to connect with main sewer lines in community streets.**

DRESSER JOINTS, FITTINGS, REPAIR CLAMPS, SLEEVES

A complete line for all types and sizes of water pipe

FOR LEAKY BELL & SPIGOT JOINTS
Style 60
ADJUSTABLE BELL-JOINT CLAMP

Highly adjustable Style 60 has wide use in water repair work. Especially good on locations subject to vibration, such as under railroad tracks, heavy traffic spots, and on bridges. Sizes 3" through 60" CIP.

FOR BRANCH CONNECTIONS TO EXISTING LINES
Style 91
PIPE SADDLE

A quick easy way to make branch connections to existing lines when tapping sleeves, tees, or other methods are not desirable. Standard saddle is equipped with exclusive Dresser rubber gasket. Also available with lead gaskets or without gaskets. Malleable and steel construction for steel and CIP. Sizes 1¼" to 20" OD.

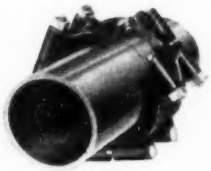
FOR SUPPLY AND DISTRIBUTION LINES
Style 38
DRESSER COUPLINGS

Proved dependable for over sixty years, on thousands of miles of municipal supply and distribution mains. Special rubber gaskets make a permanent joint, flexible enough to permit laying curves with straight pipe. Wrench is only tool needed. Available for plain-end steel, cast iron or other pipe, ⅜" ID to 72" OD and larger.

FOR JOINING SMALL PIPE
Style 65
"NO-THREAD" FITTINGS

No threading or exact pipe alignment is necessary with these simple, speedy fittings. Just stab over plain pipe ends and tighten bolts with a wrench.

Style 90 (steel) for underground work, and Style 88 (brass) for copper tubing available. All standard shapes.



FOR SPLITS AND BREAKS IN CAST IRON PIPE
Style 82
REPAIR & TAP SLEEVE

Handy sleeve repairs breaks, holes and splits in straight run of CIP quickly and securely, without service interruption. Highly adjustable for off-size pipe. Also makes a handy tapping sleeve, when needed. Sizes 4", 6", 8" CIP.

FOR LEAKS, BREAKS, SPLITS UP TO 8" IN CIP
Style 57C
CAST SPLIT SLEEVE

Standard equipment with emergency crews for repairing unexpected breaks requiring immediate attention. Used successfully for years by water departments everywhere.

Each sleeve is tested with 60-lb. air pressure and 500-lb. hydrostatic pressure before shipment. Sizes 2" to 12" CIP.

Each Dresser Style is designed to meet a specific problem of pipe joining or repair. Convenient to use anywhere, Dresser Couplings are standard equipment with municipal water departments who appreciate the simplicity and speed of these couplings under difficult working conditions. Shown above is a representative group of Dresser products for the municipal field. A complete list includes: Couplings · Insulating Couplings · Reducing Couplings · Long Sleeves · Tees, Ells, Crosses · Pipe Saddles · Expansion Joints · Split Repair Sleeves · Bell-Joint Clamps · Collar, Screwed Fittings, Clamps, Band and Saddle Clamps · Service Fittings.

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Lighting and Traffic Control

Capsule Radio Control For Street Lighting

The first master test unit of the new capsule radio control for municipal street lighting systems, invented by Broadway Maintenance Corp., was installed recently in New York. Broadway Maintenance Corp. has maintained the street lights for the City of New York for 15 years.

An important advantage of the radio control is that it provides a city with instantaneous emergency control of its street lights without additional equipment of any kind, should such control become necessary. In the case of present type controls, special installations were required during World War II to enable street lights to be extinguished for emergency "blackouts", and then they were manual controls which operated small groups of lights.

The new capsule radio control, approximately the size of an electric bulb, is so inexpensive it is disposable because it is cheaper to replace than repair. It is extremely simple in design and cannot be "jammed" by amateur or other radio broadcasts. Mounted on the top of each luminaire (light unit) it is not readily subject to pilferage or damage.

The capsule unit is a monitor-type receiver, which monitors a steady radio signal, and a switching assembly. It can be controlled from any standard commercial radio transmitter. It provides simultaneous operation of all street lights in a city which are equipped with the unit. The new unit is a substitute for both the astronomical time clock and photo-electric cell type controls currently being used.

Neither the astronomical time clock nor the photo-electric cell type of controls now used generally, have proven entirely satisfactory.

The astronomical time clock device operates mechanically on a pre-set schedule, and only within approximately 15 minutes of the desired control time. Normal daily current interruptions throw it further out of line. The units are easily subject to pilferage and mechanical damage. The photo-electric cell

● **INSTALLING the first test unit of new capsule radio light control.**

type control is easily affected by spurious lighting conditions since it depends on the amount of light which hits the cell eye. Dirt on the photo tube, automobile headlights, heavy clouds, flashing electric signs, etc., all affect the operation of this type of unit.

Full-scale production and installation of the new unit is awaiting Federal Communications Commission authorization, required because of the use of broadcast radio signals to operate it.

• • •

Cities Use Many Methods to Finance Off-Street Parking

JOINT financing by the city government and private parties is being used to finance an off-street parking lot in one of the principal business districts of Berkeley, California. This is but one of the methods being used by a number of medium-sized and large cities in attacking the downtown parking problem through a coordinated program of off-street parking lots, parking garages, parking meters, and time-limit parking. These data are summarized in *Public Management* as follows:

The Berkeley parking lot is now under construction and will be metered for 105 automobiles. It is a limited-time shopper lot located within 200 feet of the center of the city's second largest business district. The original financing plan was for the city to put up 50 per cent of the money with the balance being provided voluntarily—25 per cent by the merchants renting or leasing stores within the area and 25 per cent by property owners within the area. A "contribution district" was formed and all merchants and business property owners within 800 feet walking distance from the proposed site were considered as benefiting directly.

Merchants' contributions were figured and distributed according to volume of business done while assessed property valuations were used in allocating contributions among property owners. The entire program was voluntary, and actual contributions on the part of merchants and property owners amounted to about 36 per cent of the total requirement—somewhat short of the 50 per cent goal originally established.. The city therefore actually appropriated 64 per cent of the cost for the lot and the improvements. The cost per car space for the lot, including land acquisition, construction, and improvements, is about $1,500 per car space.

Richmond, Virginia, has acquired land for a parking lot near the principal downtown stores as part of a five-year capital improvement program. The total cost for land and improvements was $345,000. The lot has 240 car spaces, but more than 300 cars can be parked at one time if necessary. A private operator, selected by competitive bidding, leases the lot, but the city specifies parking rates, employee working conditions, methods of operation, and employee salaries. The city receives 45 per cent of the gross receipts of the lot with a guaranteed minimum of $20,000 per year.

A department of off-street parking has beeen established in Columbus, Ohio, with authority to acquire land and to construct, maintain, and operate off-street parking facilities. The facilities can include not only parking lots but also buildings, garages, ramps, and underground structures.

Hartford, Connecticut, has sold a $2,940,000 bond issue for an off-street parking garage. City engineers will design the garage, employing such outside consultants as

are necessary. Kansas City, Kansas, has sold a $340,000 revenue bond issue for the construction of a subsurface parking garage. The land site is an off-street parking lot presently owned and operated by the city.

In Niles, Michigan, all net parking meter revenues have been earmarked for the acquisition and development of off-street parking lots. A three-member parking commission has authority to issue revenue bonds for the lots.

Voters in Kansas City, Missouri, have authorized $1,500,000 in general obligation bonds for urban redevelopment projects including a 2,500-car off-street parking garage. Federal urban redevelopment funds will be used for part of the cost of acquiring and clearing the land. A redevelopment corporation will be organized to finance, with private capital, the construction of the off-street parking terminal.

Topeka, Kansas, has made an agreement with Park and Shop, an organization of businessmen, for off-street parking facilities. The city will build and Park and Shop will operate the facilities, including a 400-car parking garage and a surface lot with additional projects planned later. After Park and Shop raises $100,000 as a guarantee of interest payments, the city will authorize issuance of up to $2,000,000 in revenue bonds. The agreement provides that if revenues from the facilities are insufficient to pay interest and principal on the bonds, the $100,000 can be used for interest payments. If the facilities make a profit, 80 per cent will go to the city and 20 per cent to Park and Shop.

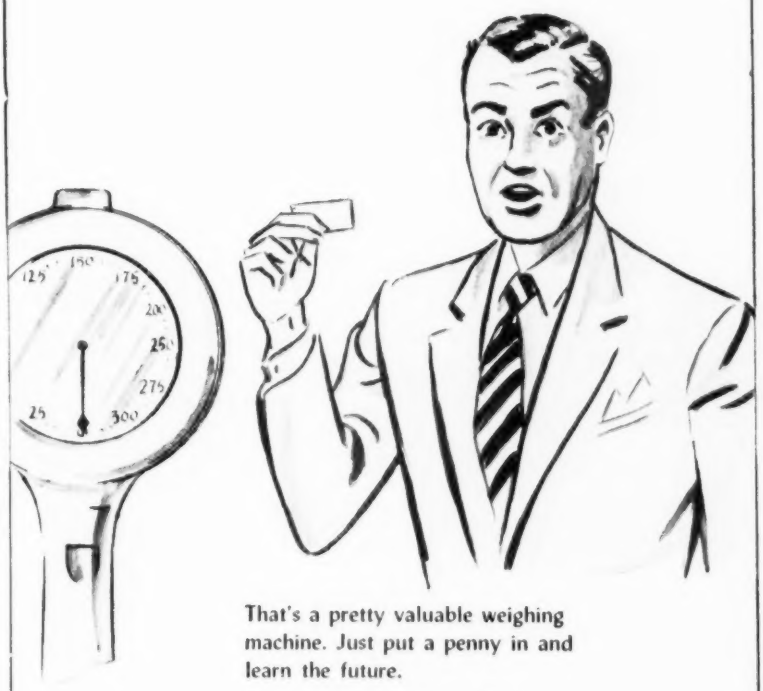
Other cities that are planning and developing parking garages under municipal sponsorship are Denver, Baltimore, Chicago, Memphis, and Philadelphia.

• • •

Data on the Ohio Turnpike

The length of the Ohio Turnpike will be 241.4 miles and the estimated construction cost is $283,356,000. The eastern terminus will be the west end of the Pennsylvania Turnpike, north of Petersburg in Mahoning County; the western terminus at the Indiana border on Route 20. The first section will opened late in 1953. Theodore J. Kauer is chief engineer and the J. E. Greiner Co. of Baltimore is consulting engineer.

"At 10:35 A. M. tomorrow you will discover that your cashier has embezzled $40,000"



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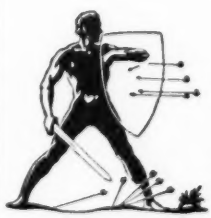

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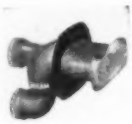
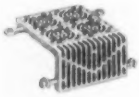
Josam SWIMMING POOL FITTINGS

INJECTOR SUPPLY FITTINGS
provide constant mixing of the entering fresh water with the water already in the pool, preventing "dead spots" in the pool.



OUTLET DRAINS
provide continuous drainage of pool water even though the discharge velocity of the grate area is reduced to a minimum to insure safety of bathers.

SKIMMER GRILLES
and other exclusive fittings designed especially for Water Level Deck Type Pools.



• Regardless of the type of pool you build, you will want to secure maximum safety and maintain the highest health standards and hygienic conditions for bathers. To accomplish this, you must know certain basic facts about water supply, circulation and drainage as well as purpose, size, shape and location of pools.

Because of the wide range of swimming pool fittings required in pool construction, Josam has made a complete study of all aspects of pool design, construction and operation. This information is free upon request. If you are planning a new swimming pool or remodeling an old one, send coupon below at once for Josam Manual SP. It's the authority in this field!

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Sludge Digesters Starting Procedures

THE initial operation of the sludge filtering and drying facilities at the South East plant at San Francisco necessarily awaited the development of a sufficient quantity of digested sludge to permit continued operation at rated capacity for specified test periods. The digesters were started by:

1. Filling one group of three primary and two secondary digesters with water and heating and maintaining the primary digesters at 95° F.
2. Seeding one of the primary digesters with one million gallons of digested sludge transported by tank truck from the Richmond-Sunset Plant over a 30-day period.
3. Transferring supernatant from this primary through the second and third primaries in series and then to the secondary digesters.
4. Transferring some bottom sludge directly from the first primary to the other primaries.
5. Adding raw sludge in an amount equal to 10% of the solids loading when 500,000 gallons of seeding material had accumulated in the primary digester and maintaining this ratio as the amount of solids in the digester increased.
6. Adding raw sludge to the second and third primaries as the solids loadings permitted.

The raw sludge seeding operation started on December 10, 1952. After 33 days the three primaries were handling the total raw sludge output of the North Point Plant, approximately 60,000 pounds per day.

Gas production from the seeded digester was first observed eight days after the start of the seeding sludge transfer. Daily production reached 3300 cu. ft. ten days after seeding operations began and 125,000 cu. ft. six days after feeding with raw sludge started. Thereafter the amount of gas production reflected the load of raw sludge added to the digesters. Digester gas was used for heating the digesters and dryers after February 15, 1952.

• • •

Rubber and Road Construction

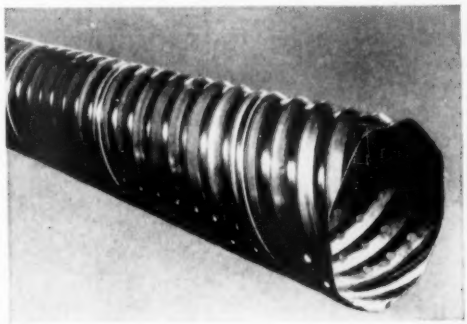
Italian experience with experimental road surfacings made exclusively of rubber was reviewed in an article by R. Ariano in Strade, 1951, 31, 141-50, and results of investigations by the Instituto Sperimentale Stradale into the effects of rubber admixtures on the physical properties of bituminous materials are discussed. Experimental surfacings have also been made with "Asfaltival", a commercial product consisting of a rubber-bitumen mixture and various sizes of aggregate. This material, which is supplied in sacks, is laid cold and then compressed. It is suggested that carpets of this material would be particularly suitable for covering badly damaged surfacings. The original article is in Italian. This review is from British Road Abstracts.

• • •

Prefabricating a Big Culvert from Multiplate

We fabricated a 120-inch diameter culvert 162 ft. long on the bank of a deep drain, using round multiplate. This was lowered into place by cables from three tractors, two on the culvert side and one on the opposite side of the drain. We got good alinement and the job was a success, but we did not get any photos of the work.—O. M. Finley, Co. Engr., Gering, Nebr.

COSTS CAN GET "STAGGERING" if subgrades drink



When subgrades absorb excess water it weakens foundations and often results in continuing maintenance of costly pavements. Repeated repairs are only a temporary answer. But you can remove this excess water once and for all with Armco Perforated Pipe.

It's economical—two ways. First, Armco Perforated Pipe saves money on installation and second, it stops excessive drain on your maintenance budget.

Installation goes fast with any crew. They just tighten a simple bolted coupling to join 20-foot sections, then backfill. Installation costs are low.

Scientifically-placed holes in Armco Pipe allow water to enter freely, yet keep out solids that could clog the system. And because of its corrugated metal design, it will not crack, crush or disjoint under heavy loads. There is no danger from severe frost action or shifting soils.

Specify Armco Perforated Pipe for correcting trouble-spots, or for preventing unstable foundations under new pavements. Write us for more details. Armco Drainage & Metal Products, Inc., 2533 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

ARMCO PERFORATED PIPE ARMCO

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Reports from the Field:

HOW MACHINES SAVE MONEY FOR CITIES

ON ROAD-MIX bituminous surfacing, we used one Caterpillar 112 motor grader; one Galion 402 motor grader; one 10-ton Galion roller; one asphalt distributor; and one DI Case tractor with spring tooth harrow. We placed a 2-inch mat with this equipment on a well-compacted 12-inch crushed rock base. O. C. Thoreson, Sup't. of Public Works, Caledonia (2300), Minn.

FOR EXCAVATING for street base we used a motor grader, front-end loader and trucks to haul away the excess dirt. We used a drag line to lay concrete pipe and find it much faster than a truck with winch. In street building, we use the blade to windrow the dirt for picking up with the front-end loader. We have a Caterpillar 12 grader and a D4 tractor with front-end loader. After the base is shaped, we roll it with a 10-ton Buffalo-Springfield roller. For surfacing, we use a 900-gal. asphalt distributor. The first application is 0.3 gal. of OH 135 asphalt, and this is covered with ¾-inch limestone. Second application is 0.4 gal. of asphalt, which is covered with ⅜-inch stone. Each coat is broomed and rolled. A spreader box is used to spread the stone.—C. L. Stewart, Ass't. Engineer and Street Superintendent, Sherman (28,000), Texas.

OUR BUCKEYE trencher is saving us 30 per cent in trench work.—J. P. Tackett, City Manager, Graham (7,000), Texas.

MOST EFFECTIVE equipment is our Seaman pulvimixer on soil-cement streets. In preparing some 35,000 sq yds. of soil-cement base for residential streets, we used the pulvimixer, two motor graders, two water wagons, one rubber tired roller, one tandem roller, two crawler tractors and a double-drum sheepsfoot roller. We plan to continue this work and we have a program mapped out for the spring of 1953.—Don J. Adams, Supervisor of Public Works, Union City (8,000), Tenn.

WE ARE BUILDING 52,000 ft. of sewer line, using our own equipment and crews. We are using an HD 5 tractor with bulldozer, a 200 Osgood backhoe, an Ingersoll-Rand air compressor and a Ford tractor with a home-made boom on it.—J. W. Arbuckle, City Clerk, Lewisburg (5,165), Tenn.

FRONT - END LOADERS, a sweeper and dump trucks are used for clearing snow from the streets while, for street work, we use the front-end loader, a bulldozer and a motor grader. We are planning to purchase a leaf pick-up machine.—Carl T. Norris, Ponca City (22,000), Okla.

THIS CITY MAINTAINS its own municipal garage which regularly services all equipment and makes any repairs feasible. Any time a piece of equipment is gassed or serviced in any way, a ticket is made out describing the job done. These are entered on a journal sheet, of which one is kept for each piece of equipment. Thus we can quickly note the amount of maintenance per unit of work, since mileage or hours is taken at each refueling or service. — Walter J. Brown, Administrative Assistant to the City Manager, Enid (36,000), Okla.

STOP WEEDS

...for lower maintenance costs!

this powerful weed killer can keep ground bare of weeds and grasses

Highway Commissions and large scale industrial users prefer BORASCU Weed Killer because they know they can depend on the results . . . it's quick and easy to apply; provides long-lasting control at low cost. BORASCU is not only useful for the destruction of weeds and grasses but also for the pre-treatment of asphalt or gravel covered areas to protect against the possibility of weeds breaking through the paved surface and destroying it. Countless parking areas, airport landing fields, and storage areas have been given the protection of BORASCU . . . it's good insurance for any paving job!

SO EASY TO APPLY
Just a man . . .
a pail . . .
and BORASCU

NONTOXIC • NONFLAMMABLE • NONCORROSIVE to ferrous metals

Service Bulletins, and Quotations Sent on Request

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DIVISION OF BORAX CONSOLIDATED, LIMITED
630 SHATTO PLACE • LOS ANGELES 5, CALIFORNIA

LINK-BELT sanitary engineering equipment is built to last with LINK-BELT components

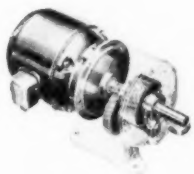
IN municipalities and industrial plants all over the country, Link-Belt water, sewage and waste treatment equipment provides reliable, efficient service. There are two important reasons for this outstanding record—

First, Link-Belt designs are based on broad experience and sound engineering . . . assure the finest in modern treatment techniques. Second, and equally important—Link-Belt equipment is built to the highest standards with Link-Belt power transmission and conveying components. This is your guarantee of long-life, high-efficiency operation.

The Link-Belt line includes coarse and fine screens, grit and sludge collectors for grit chambers and settling tanks, scum breakers for digestion tanks and sludge handling equipment. Our sanitary engineers will be glad to work with your engineers, chemists and consultants—help you get the best in modern treatment equipment. Call the Link-Belt office near you for complete information.

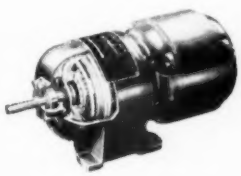
P.I.V. VARIABLE SPEED DRIVE

For positive, infinitely variable speed selection. Choose from 16 types, ½ to 25 hp, reduction ratios 6:1.



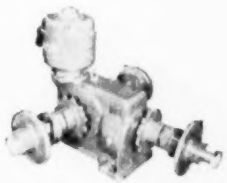
GEARMOTORS

Safe, compact, efficient. Output speeds from 6 to 280 rpm in standard line of double and triple reduction units.



ELECTROFLUID DRIVES

Hydraulic coupling combined with induction motor for smooth starting and shock load protection. Avoids "over-motoring."



WORM GEAR DRIVES

Suited to high ratio reductions, with vertical or horizontal output shafts. Quiet, smooth, compact. Output rpm: 0.22 to 564.

ROLLER CHAIN

For positive power transmission at high or low speeds, coordinating rotation of numerous shafts. Long or short centers.

PROMAL CHAIN

This stronger, longer-wearing malleable alloy has toughness, strength, high yield point, high resistance to abrasion.

BELT CONVEYOR IDLERS

Husky, self-aligning roller bearings maintain alignment. Grease in-dirt out seals preserve lubricant longer.

SCREW CONVEYORS

Sectional flight and helicoid types. One moving part. Compact. No return run. Horizontal, vertical or inclined operation.

BALL & ROLLER BEARINGS

Full line of precision pillow blocks, flanged, flanged cartridge, cartridge, hanger, and take-up blocks for every need.

SPROCKET WHEELS

Teeth are accurately cast and hand ground to fit chain correctly. A type for every chain, a size for every requirement.

PEAK CAP BEARINGS

Water lubricated, Self-Aligning; prevent accumulation of sludge on all submerged bearings of Collectors.

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SANITARY ENGINEERING EQUIPMENT

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities. 13.144

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All-Weather Road Pleases the Voters

L. A. TILTON,
County Engineer, Medicine Lodge, Kans.

THE one thing that most pleased the people of Barber County was the construction of 10 miles of single treatment asphalt road and one mile of 2-inch asphalt mat. The road was first brought up to standard state specification. A 4-inch subbase was then obtained by the addition of 30 to 50 percent, by volume, of gravel or heavy sand. This was spread on the road and mixed in place to a depth of about 6 ins. with scarifiers attached to motor graders. A Seaman pulverizer was then used to break up the large pieces and to make a uniform mixture. The number of passes with the Seaman depended on the class of material used.

If the ground was too wet, the apron of the mixer was opened so that it would dry out the ground; where necessary, water was placed on the road ahead of the patrols and again ahead of the Seaman mixer, so that the right water content for maximum compaction was obtained. A pneumatic roller was used to obtain a compaction of 100 percent, and sometimes we got better than this in the lighter red soils.

For a prime coat, we used 0.25 to 0.30 gal. per sq. yd. of RC3 oil; this was followed by about 30 lbs. per sq. yd. of washed graded gravel; and then by rolling the first day with a pneumatic roller with a drag broom. The second day we used a steel roller and a drag broom; and again the third day, if it appeared necessary. This road has been very satisfactory and has stood occasional loads of 50 tons or better. The bituminous mat work was done by contract and was placed on a single penetration base as described above.

The most spectacular part of the work was making a fill about 40 feet high and realining about a mile of the road around the head of a canyon. We straightened the road and reduced the grade to about 6 percent. No culvert was used as the storage space above the fill should be ample to store any runoff. The job was made more complicated when we ran into about 3 ft. of very fine sand about half way down in a rather deep cut.

• • •

The "Scootcrete" Eases Costs of Handling Materials

Most of our work is by contract. Last year we completed a 48-inch storm sewer with lake outfall at a cost of $55,000. Equipment used included a crane and pile driver, backhoe, electrical welder, air tamper and concrete mixer. On a paving contract amounting to $107,000, equipment included a motor grader, front-end loader, trucks, batch plant and paving mixer and equipment. Other work included a $50,000 shore protection project and a $600,000 power plant addition. On this, the Scootcrete was used very effectively. This is a front-end loader and mechanized wheelbarrow which is made by Getman Bros., South Haven. It is fine for moving materials, handling aggregates, unloading steel and hauling brick and concrete.—Max L. Norris, Sup't., Board of Public Works, South Haven, Mich. (Population 5,800.)

For Faster Installations ...RAIN OR SHINE

CLOW
Mechanical Joint
Cast Iron Pipe, Fittings and Valves

Clow Mechanical Joint
A time-saving, easily installed mechanical joint cast iron pipe that reaches the job complete with all joint materials. Sizes 3" to 24" in 18-foot lengths.

It's always "fair weather" when you install Clow Mechanical Joint Cast Iron Pipe, Fittings and Valves. Even in a wet trench or under water, ordinary workmen can quickly do the job with ratchet wrenches. No calking needed. And once installed, this pipe line is set for a century or more of service. Each joint is sealed "bottle-tight" by a heavy molded rubber gasket—yet stays flexible to compensate for vibration, expansion or contraction. "Standardized" parts is another feature . . . glands, bolts and gaskets are completely interchangeable.

CLOW MECHANICAL JOINT CAST IRON FITTINGS

Mechanical Joint 90° Elbow

All types offered in straight and reducing sizes for use with Clow Mechanical Joint Cast Iron Pipe.

Mechanical Joint Tee

CLOW FOUNDRIES are fully equipped to produce Bell and Spigot cast iron pipe, fittings, valves and many pipe line specials.

EDDY MECHANICAL JOINT GATE VALVE

Workmen can quickly install these valves, using just a ratchet wrench to make up the joints pressure-tight. Weather is not a problem—for no calking or lead melting is necessary. Available in sizes 3" to 12" for use on both centrifugally cast and sand-cast iron pipe.

JAMES B. CLOW & SONS
201-299 North Talman Avenue • Chicago 80, Illinois
CAST IRON

and their National Cast Iron Pipe Division, Birmingham, Alabama; subsidiaries Eddy Valve Co., Waterford, New York, Iowa Valve Co., Oskaloosa, Iowa

HERE'S HOW FOSTER SIRENS FOR WARNING SYSTEMS

Meet CD Requirements:

- **They are HEARD**

125 to 130 decibels at 100 ft.—High enough to overcome a street or shop level of 70 to 80 decibels with plenty to spare. Non-directional.

- **They are RECOGNIZED**

Sharp, distinctive howl is instantly identified as a warning.

FOSTER
TYPE 45
SIREN

- **They are ALWAYS READY**

Start instantly in coldest weather. Simple and rugged mechanically with few moving parts. Practically fool proof.

- **They are VERSATILE**

Require a steam supply of less than 1500 lbs. per hour at 75 lbs. pressure, available in most laundries, utilities, and industrial processing plants. Can be manually operated or solenoid operated and tied in with other units in the warning system.

Comparative tests show Foster Sirens are lowest in cost per square mile covered. They are simple to install and are low in operating and maintenance costs thereafter.

There are Foster representatives in principal cities. Ask for Bulletin 29.

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Tachographs Tell Story of Track Movements

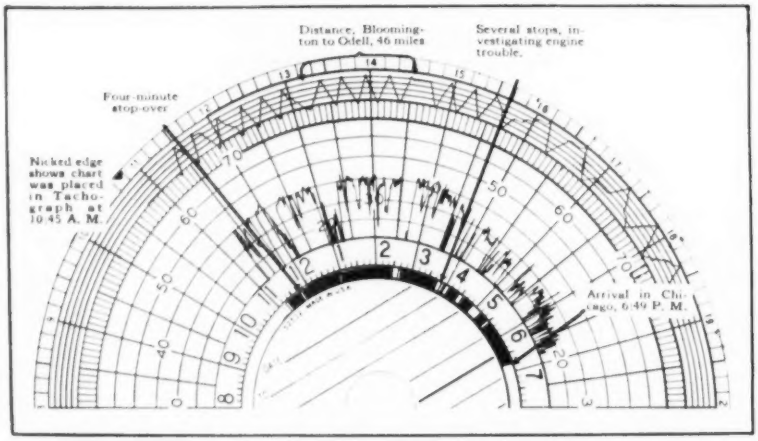
JOHN HUBEL

THE city of Milwaukee has Tachographs on 111 of its compression type rubbish collection trucks and on 10 of its power brooms used for street cleaning. The Tachographs are furnished by Sangamo Electric Co., and distributed in the Wisconsin area by Wagner Electric Corporation of St. Louis. The first 46 Tachographs were put into service in 1948 and the balance was installed as additional rubbish collection trucks were purchased.

The charts on the trucks are changed daily and sent to supervisors of divisions requiring the services of the trucks. This gives them an opportunity to check each day how the crews operating the rubbish trucks are behaving as to the time the trucks spend at each stop during the working day. In this way the supervisors can question the employees accompanying the trucks regarding reasons for delays, missed trips, or any other factor indicated by the chart record. The crews know that there is no way of evading the recorded facts on the Tachograph charts. Beyond this, however, a record of equipment failures—trucks taken out of service for any reason—or delays due to other causes beyond the crew's control, is now considered very valuable by the department.

Another story the Tachograph record tells the supervisors is whether trucks are used in the most efficient manner relative to route layout. This helps in making revised layouts of routes or in instituting other changes necessary for greater efficiency of the service.

When the Tachographs were first installed on the trucks in this city, they were not readily visible to the


Distance, Bloomington to Odell, 46 miles
Several stops, investigating engine trouble.
Four-minute stop-over
Nicked edge shows chart was placed in Tachograph at 10:45 A. M.
Arrival in Chicago, 6:49 P. M.

● **REPRODUCTION of a portion of the tachograph chart shows engine operating periods (solid inner band), speeds (center band), and distance traveled (outer band). Nicks in edge of chart are made when chart is changed.**

ALBERT'S "SPEED-LAY" MEETS THE TEST!

Albert Pipe Supply Company's world famous SPEED-LAY Pipe System again proved itself in an actual demonstration of emergency pipe laying by unskilled workers. In the recent Civilian Defense air raid test, SPEED-LAY was used to provide the "bombed" area with a semi-permanent water line. The simplicity with which it can be assembled and broken down, makes SPEED-LAY a must for any emergency where existing permanent installations need temporary, though efficient, replacement . . . water lines for drinking or fire-fighting, air lines, gas lines, and sewage disposal.

A SPEED-LAY "package" includes prepared pipe and all necessary valves, fittings, couplings, and accessories.

NEW YORK HERALD TRIBUNE, AUGUST 13, 1951
NEW YORK TIMES, AUGUST 13, 1951
NEW YORK NEWS, AUGUST 13, 1951
Portable Pipes Pass Test for Atomic Defense

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truck drivers or crews, but this was changed later and now they are in plain view of all of the men connected with the truck. It was also found that cab installation of the Tachograph was necessary as the device also acts as a speedometer for the truck. When the first ones were installed and put into use, there was no complaint from the truck drivers, but the loading crews did not like the idea of being checked up on in respect to their efficiency.

• • •

Highway Maintenance

(*Continued from page* 80)

mowers have been equipped with long arms and low mold board for pushing back shoulders beneath guard fence cable. In winter the mowers are equipped with front end loaders for cinder-loading.

Plowing Snowy Roads

Divisor strips presented an obstacle to snow plow operators, as well as motorists, until a V-type wooden snow plow was designed for use on four-lane pavements. The plow rides the divisor strip, pushing the snow to each side. This permits the big plows to remove the snow without danger of striking the divisor and also eliminates danger of alternate freezing and thawing of the divisor snow with consequent glaze ice on the roadway.

Air temperatures at times interfered with the consistency of paint in the traffic line machines. To correct this a paint strainer with a Taylor thermostat and heating coil was installed. This coil is heated with hot water piped from the hot side of the thermostat on the air compressor, and an 85° temperature is constantly maintained.

Hand rollers, constructed of 18-inch sections of 12-inch salvage metal pipe filled with concrete, are used by caretakers in conjunction with surface and skin patching. These end the need for hand tamping and obtain better results in faster time.

In the field of commercial equipment, front-end loaders have been developed into perhaps the most versatile machines in the Department. The men use them on cinder and snow piles during the winter season. They are used to place heavy drainage pipes in open ditches; raise structural steel on bridge projects; place bridge floors; and pull guard rail posts. Such loaders are also utilized to grade slopes, dig drainage ditches and move earth

ON IRRIGATION PROJECTS, TOO—*as on all types of trenching jobs*—Clevelands show why they are known throughout the world for outstanding, all-around Dig-Ability. The reason is simple: Clevelands deliver big daily production year after year, with utmost dependability and at very low cost. That's why Clevelands are *RIGHT on the line* for you!

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Continental . . . sign of fence economy, stretches your fencing dollar by protecting persons and property years longer than ordinary fence. Continental combines galvanized fabric and better engineered fittings with sturdy fence installation. Investigate Continental before you specify any other chain link fence.

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Please send FREE copy of "Planned Protection"—complete manual on property protection.
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DRILL CONCRETE
EASIER! FASTER! BETTER!

RCD Drill Bit for use with rotary electric or air drills

Drills perfect, precision holes even in *reinforced* concrete. Super fast and easy (6" deep hole in 1 minute!) Pays for itself in time-savings. Made to last.

RCD Concrete Drill Bit—the original and unsurpassed. Sizes: ¼"—4" (larger sizes special)

Widely used for the past five years by most of the largest U. S. corporations, manufacturers, and utilities, as well as thousands of smaller firms, installation men, contractors, electricians, plumbers, etc. Superior concrete drilling **plus longer drill bit life due to FREE factory resharpening service** keeps them sold.

Personalized guarantee given to every RCD Drill Bit user
If dealer cannot supply (or service), buy direct.

Send for illustrated literature and price list

ROTARY CONCRETE DRILL CO.
650 S. Arroyo Parkway, Pasadena 1, Calif.

WATER SUPERINTENDENTS:

Consider the Advantages of Pollard L-P Gas Burner Furnaces

Burns L-P Gas (commonly known as "Bottled Gas"). Thoroughly tested and proven. Melts approximately 50 lbs. of lead in 9 minutes. Flame can be adjusted to maintain desired temperautre. One cylinder of gas will operate unit for many hours. Cylinders are made of armor plate.

Catalog No. 26 on Request.

JOSEPH G. POLLARD CO., Inc.
PIPE LINE EQUIPMENT
New Hyde Park, N. Y.

install underground pipe without breaking ground surface

for water, gas and sewer lines

Bores up to 3" in diameter and 150 feet in length. Accurate within 1" of target area.

Speed of 1½ f.p.m. 1000 feet per gallon of gas. Automatic warning of underground hazards.

Saves thousands of dollars per year. Buy it out of these savings.

Immediate delivery. Send for details now.

LUBE-JACK CO.
P.O. Box 1100 Santa Monica, Calif.

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on short hauls. Probably other uses have been found for this machine, which appears to be a favorite all-purpose piece of equipment.

Power shovels also receive ample extra use. They are likewise used to handle steel; tear up and remove old bridge floors; and, with attachments of pans and scrapers, on slopes as well as level surfaces. A caterpillar tread equips them for dragging cut slopes with a minimum of labor.

The self-propelled mechanical pavement breakers have been equipped to serve as backfill tampers. On concrete patching these have eliminated the need for slow and costly hand labor and for pneumatic pavement breakers and air compressors.

The motor grader, apart from snow removal conversion, has been adapted for widening operations by attaching deep and narrow cutting edges, which cut the widening trench and also scrape the excavated material up to the highway surface for removal by automatic loaders.

The Pennsylvania Department of Highways utilizes nearly 11,000 units of manufactured equipment to keep the 41,000 miles of State highway in first class condition, summer and winter. This equipment has an original value of $16,000,000. In an average year $2,000,000 in new and replacement equipment is added.

More than 7,000 units of equipment, both owned and leased, as well as 600,000 tons of cinders are thrown into the winter battles with snow and ice. The snow operation alone requires an expenditure of between $5,000,000 and $9,000,000 depending upon the depth of the snow fall and the frequency of ice storms.

The maintenance forces, scattered throughout Pennsylvania's 67 counties, are coordinated and their efficiency increased both winter and summer over a radio-telephone network which includes 350 mobile and 67 land stations as well as the central transmitter near Harrisburg.

• • •

Treatment Plant is Showplace of City

(*Continued from page 77.*)

cu. ft. of gas. Supernatant from the secondary digester is returned to the primary clarifiers. The digesters are Dorr equipped.

Each digester is 65 ft. in diameter and has an effective depth of 26 ft., providing a total available volume of 180,000 cu. ft., or 3.6 cu. ft. per capita. The building connecting the

digesters contains all of the sludge handling equipment, including two raw sludge pumps, two sludge recirculating pumps, a hot water boiler and recirculating pumps and two spiral heat exchangers. Digested sludge will be pumped to one or more of the 19 open sludge drying beds. Each bed is 20 ft. wide by 109 ft. long, providing a total area of 41,400 sq. ft. or 0.83 sq. ft. per capita.

Although the flow sequence as described above provides for single-stage treatment, the plant is so designed that a modified two-stage system may be employed. This is accomplished by dividing the recirculation well into two compartments and pumping through both force mains to Diversion Box 2, with the sluice gate connection between the two compartments closed. This arrangement sets up two recirculation cycles; one is between the primary clarifiers and No. 1 Biofilter and the other between the final clarifiers and No. 2 Biofilter. A bypass line from No. 1 Biofilter effluent box and Diversion Box 1 is provided to accomplish this purpose.

Seldom is such an attractive site as the one at Easton available for a sewage treatment works. The plant is adjacent to U. S. Route 611, the main artery between Easton and Philadelphia and overlooks the picturesque Pennsylvania Canal paralleling the Delaware. For this reason, special consideration was given in design to make the plant attractive from the highway. That this has been achieved is apparent from the photography herewith. Without a doubt, it is one of the most beautiful sewage treatment plants in the country.

The general construction contract, including all structures, piping and mechanical equipment, was performed by Consolidated Construction Company of Woodbury, New Jersey, under the field supervision of L. G. Stephens. Other contractors were H. N. Crowder, Jr. of Allentown, Pa., electrical work; Modern Heating and Ventilating of Philadelphia, plumbing and heating; Henry C. Shultz Company of Easton, ventilating; and D. Richard Jafolla of Boyertown, Pa., diversion structures. Construction was supervised by Glace and Glace, Consulting Engineers, Harrisburg, Pa. Equipment furnished, in addition to that already listed includes: Chlorinators, Wallace & Tiernan; recirculation pumps, Peerless; cone valves, S. Morgan Smith; gate valves and sluice valves, Mueller; plug valves, Homestead; and electrical controls, Westinghouse.

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PUBLIC WORKS DIGESTS

THIS section digests and briefs the important articles appearing in the periodicals that reached this office prior to the 15th of the previous month.

HIGHWAYS AND AIRPORTS . . 106
WATER WORKS 112
SEWERAGE AND REFUSE . . . 122

THE HIGHWAY AND AIRPORT DIGEST

Filling Over Swamp At Newark Airport

In building a new runway recently completed at the Newark, N. J. Airport, a serious problem was to so construct the fill on the deep mud of the tidal meadows that it would attain final settlement in six months or so instead of several years, which would be required by ordinary fill methods. To accomplish this, a five-phase program was carried out. First sand was pumped onto the area to a depth of 4 to 5 ft. to make a working platform. Then a grid of vertical sand drains were sunk encompassing the entire area of the new runway, and totaling 570,000 lin. ft. Drains of 6- or 8-in. pipe were laid from the tops of the vertical drains, across the working platform to outlets for the water which rose in the vertical drains as it was squeezed out of the soil by the fill. Then sand was pumped onto the platform to form the fill, at a controlled rate to accelerate settlement, and this was continued to provide a temporary overload 4 to 6 ft. deep to compress the soil below. When settlement had ceased, the surcharged material was removed laterally to a position where it would serve to widen and counterfort the fills along the shoulder edges.

"New Runway for Newark Airport;" *Roads and Streets*, February.

Car Traffic Across the English Channel

In 1952, 96,000 cars were carried in each direction across the English Channel by ferry boats especially designed for this purpose. In addition there are two air lines carrying cars between England and France, each plane carrying two cars and their passengers. With these conveniences, England is tied in with the proposed international route from Calais through Vienna, Istanbul and Damascus to Calcutta—a total distance of 7,818 miles.

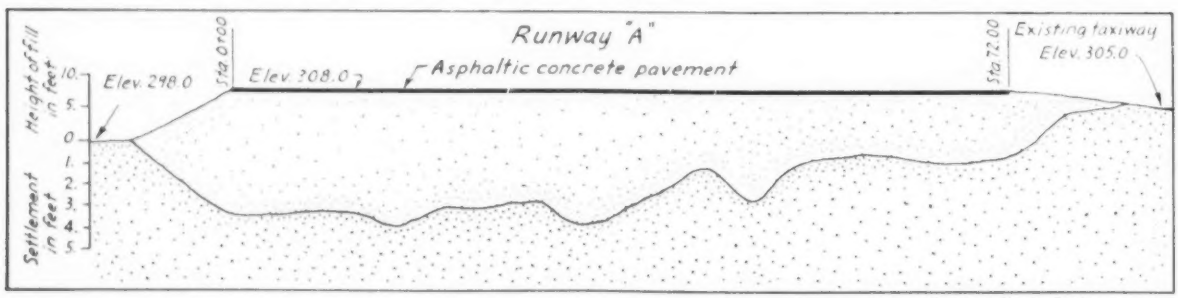
"International Routes;" by K. L. Kelly, Assoc. Inst. of Highway Engineers. *Contractors Record*, Feb. 11.

Equipment for Highway Maintenance

During the past two years Florida's Road Dept. has rehabilitated 200 to 300 miles of shoulders and front slopes using disks, motor graders and front-end loaders to shape them, followed by mulching. For the latter they spread hay or straw 2 to 3 in. thick, cut it into the soil about 4 in. deep with a rotovator, and apply seed and roll with a cultipacker or a traffic roller. Meantime, fertilizer is applied, 200 to 300 lb. per acre and the same amount after the seeds have germinated. The roadsides are kept mowed for appearance, using rotary-type pasture mowers cutting a 5 to 7½-ft. swath. They find these much more economical than the sickle-type mower, which they used formerly, and cut almost twice as fast.

"Reducing the Cost of Roadside Mowing and Shoulder Maintenance"; by R. C. Bannerman, Jr., Engr. of Maint., Florida State Rd. Dept. *PUBLIC WORKS*, March.

For shoulder grading and ditch cleaning, Illinois finds motor patrol graders with 10-ft. and 12-ft. blades to be exceptionally efficient. These are accompanied by power loaders, either force-feed-belt type or tractor-mounted end loaders. The former load four or more dump trucks. For mowing the 14,000 miles of State



Courtesy Roads & Streets

● CROSS-SECTION of runway foundation showing settlement of sand blanket into swamp.

highways, the State owns 600 power mowers, from 11 to 25 hp., which have 5-ft. cutter bars. These clog frequently, requiring many stoppages for cleaning; and tall weeds, when cut, shade the grass and clog gratings when washed to them by rains. During 1953, spinner-type mowers will be tried to see if they give a more uniform cut and cut the grass suitable to form a mulch. For removing dead and unwanted trees and cleaning up after wind storms, 35 gasoline chain saws are used. For spreading cinders in winter, the large box-type, power operated spreaders are found efficient around large cities. They also use 178 spinner-type and 401 gravity-feed tailgate spreaders.

"How Equipment Lowers Cost of Highway Maintenance;" by C. W. Ross, Engr. of Maint., Illinois Div. of Highways. *PUBLIC WORKS*, March.

Inventorying Highway Deficiencies

In June 1952 the highway committee of the County Supervisors Ass'n of California recommended that the association study the most urgent deficiencies of the county road systems. All county road commissioners were requested to list the existing deficiencies, on forms which indicated them by code numbers. 1. Present surface inadequate: (a) too narrow; (b) new type needed; (c) reconstruct present type; (d) poor base or subgrade; (e) poor drainage. 2. Poor alignment. 3. Sight distance limited by curves. 4. Sight distance limited by rolling hills. 5. Safety characteristics. 6. Maintenance costs exceed county average for type of surface. 7. Other deficiencies. Similar information on bridges was asked also. The reports show deficiencies amounting to $280,973,900 on 11,372 miles of the 18,743-mile county primary system, and 964 bridges that need reconstruction or replacement.

"California Counties Inventory Critical Highway Deficiencies;" by Vincent T. Cooper, Asst. Mgr., Co. Supervisors Ass'n. *Better Roads*, February.

Coal Tar and Rubber For Jet Plane Runways

Studies being conducted by the U. S. Air Force indicate that most of the injury done to asphalt pavements by fuel spilled from jet air planes can be avoided by using coal tar with which synthetic rubber has been blended as a binder for such pavements. Jet fuels are petroleum distillates and when spilled on con-

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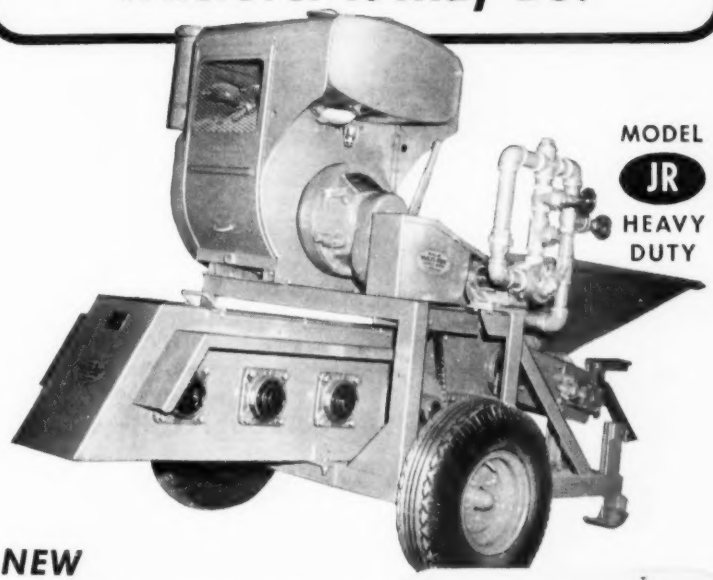

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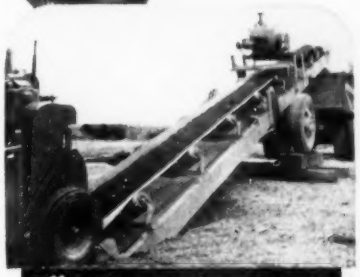

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crete pavements dissolve joint fillers of the asphalt type; but fillers of tar and of tar and synthetic rubber were developed which proved successful in eliminating this. The latter especially was so resistant to jet fuel that its use for a surfacing for asphalt pavements is being tested. Various blends are being tested. The amount of rubber has to be limited to avoid gumming up pumps, valves and piping in the hot-mix plant. Surface courses built with these mixtures appear to repel spilled fuel completely and to resist the heat from the blast from jet engines for a period of several minutes at partial power and for somewhat shorter periods when operating at full throttle.

"Coal-tar Pavements Containing Rubber Show Promise for Jet-Plane Runways;" *Engineering News-Record*, March 5.

Lime Stabilization On Texas Secondary Roads

The Texas Highway Dept. has been using lime stabilization on secondary roads since 1945. It has found that adding 3 to 5% of hydrated lime to the clay soils of that region reduces the plasticity index from 60-70 to a value between 5 and 15; the liquid limit of the soil is lowered, and the compressive strength approaches one-third that of portland cement concrete in some cases, but much less in others. An effort to reduce the cost was made last year by using quicklime instead of slaked lime. A ton of quicklime has the CaO content of 1.32 tons of hydrated and costs only 73% as much; but because of greater costs connected with its use, only about 20% more base can be stabilized with quicklime at the same cost. In using it, clay from backslopes and ditches is spread on the road and quicklime is spread on this at the desired rate and immediately worked into a windrow with the clay, water being added meantime until the quicklime is slaked and optimum moisture for compaction reached. The admixed soil then is spread and compacted by a sheepsfoot roller followed by a pneumatic tire roller. The cost for stabilizing a half mile averaged $3.10 a cubic yard, or about 50¢ a square yard 6″ deep.

"Texas Stabilizes Roads With Quicklime;" *Engineering News-Record*, Feb. 5.

Rating System for Improvement Priorities

The Highway Dept. of Hartford Co., Md., has adopted a rating system for determining priorities in road improvements. The basic plan takes into account the number of homes along a road, the traffic volume, its importance as a federal-aid secondary route, a school bus route, or a connecting link between two hard-surfaced roads.

Ratings for residences range from 1 point for 5 or less residences to 5 points for 21 or more residences. Traffic of 50 vehicles or less counts 1; of 201 or more vehicles, 5. One point is allowed if the road is a connecting link and if it is a proposed school bus route and if it is a possible federal-aid secondary route. The points for each road are added, and the sections with the highest classification are recommended by the highway department to be placed on the improvement program. The county roads are divided into three improvement programs. The first 5-year program includes roads with total points of 5 or above. Those with 3 or 4 points are allotted to the second 5-year period. Changes in traffic patterns and residential construction necessitate annual reclassification of the roads.

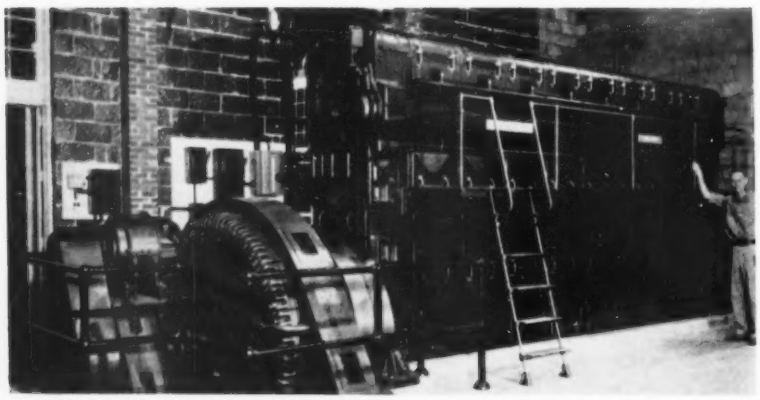
"Code System Fixes Work Priorities;" By George A. Grier, Exec. Asst. Engr., Hartford County H'way Dept. *Better Roads*, February.

• • •

Sewage Treatment Plant Produces Fine Effluent

A modern sewage treatment plant, recently completed by Brookhaven, Miss., is producing an excellent effluent. It was designed for a flow of 1 mgd and to handle a sewage having a BOD content of 200 ppm. The primary clarifier is

Dual-Fuel Diesel Saves Nearly Half the Fuel Cost



● **DUAL-FUEL ENGINE, 875 HP, direct-connected to 600 KV generator carries entire power load for Woodfield from 9 in morning to 11 at night.**

L. W. MARPLE,
Plant Superintendent,
Woodsfield, O.

FUEL costs have been cut practically in half in Woodsfield, O., through the installation of a dual-fuel diesel engine in its municipal electric plant. This engine, which is a Superior 8-cylinder, capable of developing 875 hp, was purchased about two years ago. Operating at 327 rpm, it is direct-connected to a 600-kv generator. Major fuel is natural gas, supplemented by 10 percent diesel oil for ignition. Gas is purchased at 37 cents per thousand cubic feet. Using gas, the engine operates at a cost of about 4.8 mills per kw, averaging 60 percent load, as compared to a cost of 9.5 mills with diesel fuel.

At the present time, this engine carries the entire load from 9 AM to 11 PM, while two additional 200-kw units handle the night load, which averages about 170 kw. Loading on the plant, in addition to the domestic requirements, include 155 hp by three feed mills; 75 hp and 50 hp respectively by the water purification plant; and 20 hp by the sewage treatment plant.

This engine has been doing a wonderful job for us, and it operates at a tremendous saving to the community.

45 ft. in diameter, with 9 ft. sidewater depth, equipped with Spiraflo mechanism, and provides 2 hours detention for the design flow. Secondary treatment is provided by a 65-ft. diameter Aero-Filter, 6½ ft. deep, with a loading of 1.5 lbs. of BOD per cubic yard of media. The secondary clarifier is the same as the primary.

Tests run last September by the State Department of Health gave the following results: Flow 0.444 mgd; raw sewage BOD 140 ppm; primary effluent BOD 80 ppm; final effluent BOD 10 ppm. Equipment for the plant was furnished by Yeomans Bros. Co., and included also Shone ejectors; recirculation pumps; sludge digester providing 4 cu. ft. per capita; sludge pumps; and compressors. The plant was designed by W. E. Johnson of Jackson, Miss., and built by Dickerson & Bowen of Brookhaven. The sewage is mostly domestic waste, but includes discharge from a creamery and from other small local businesses.

• • •

Controlling Street Openings and Appurtenant Construction

IN order to develop a sound program for controlling street and curb openings, sidewalk construction and maintenance and driveway and utility facilities, the City of Salinas, Calif., has adopted ordinances and regulations providing for control by the Public Service Department, of which Thomas G. Dunne is Director.

An ordinance adopted many years ago required a deposit as security that work of this nature would be "diligently prosecuted." The charges were set at that time at 50 cents for each square foot of paved street to be opened, and 10 cents for unpaved streets, sidewalks and alleys, and the work was to be done after issuance of a permit by the street superintendent. Prompt and satisfactory replacement of the disturbed surface was required by the ordinance. As an alternative to the deposit, a bond could be filed.

Under present regulations, a fee is charged for granting the permit. The minimum charge is $1.00 but the fee is normally based on a rate of 2 cents a square foot for the sidewalk, driveway aprons or paved street area to be constructed or reconstructed; 2 cents per lineal foot for curb or curb and gutter; 1 cent a square foot for unpaved streets; and an additional $2 for each connection to a sewer or storm drain. Fees are not required from any utility company having a franchise from the city; from any contractor working for such utility; nor from any contractor having a city or governmental contract.

Standard plans and specifications have been prepared which must be followed. The Engineering Bureau of the Public Works Department makes the necessary inspections to see that the work done complies with the standards. The Administrative Division of the Public Service Department maintains centralized records, including a spot map which indicates all excavations not yet completed, an index of completed work and the applicable maps and correspondence. A form of application and permit has been devised which indicates the exact location of the proposed work and gives information concerning its scope.

• • •

Leo Ritter

(*Continued from page* 14)

pleted and in future years. Second, and perhaps more important at the moment, a clear understanding of

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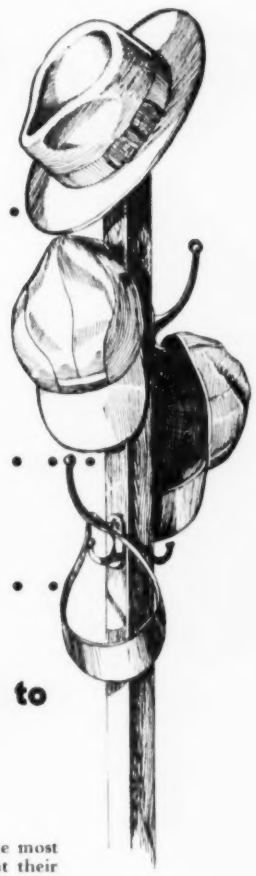

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● **QUICKWAY TRUCK-MOUNTED dragline owned by Parke County, Ill., Highway Department, has reduced cost of gravel handling very considerably. William P. Isaacs is Superintendent of the Highway Department.**

● **This GARDNER road mixer has been used on several miles of San Joaquin County, Calif., roads. Photo shows the machine mixing a windrow. J. B. Manthey is County Engineer. The photo was sent to us by Clement A. Plecarpo, Office Engineer.**

● **THIS HANDY LIFTER, shown here moving a large concrete pipe, was planned and built by Clyde Warr, Sup't of Roads. Photo was sent to us by John C. Brown, County Engineer, Clayton, Alabama.**

the factors which determine capacity can lead to more efficient use of many of the roads and streets which we now have.

The manual is very detailed and comprehensive. However, two simple examples will suffice to show how this information can be used to improve the capacity of existing facilities.

First, consider a two-lane rural highway. The maximum practical (working) capacity of such a route under ideal roadway and traffic conditions when sight distances are not restrictive is 900 passenger cars per hour (uninterrupted flow). Prevailing conditions are generally not ideal and the practical capacity may be sharply reduced by such things as narrow lanes, restricted lateral clearances (as at a bridge or those caused by uncontrolled roadside development), inadequate shoulders, the presence of trucks and buses, grades, and imperfect alignment. In the Manual, information is presented for numerically evaluating the effect of these deviations from the ideal.

For example, data presented therein show that the practical capacity of a two-lane highway which has a 20-foot surface, frequent obstructions within 4 feet of the edges of the pavement, 10% commercial traffic and a somewhat restricted sight distance over 60% of its length would be reduced to 343 vehicles per hour.

Practically, this would mean that the number of hours during which congestion would occur would be much greater than it would be if roadway and traffic conditions more nearly approached the ideal. For example, if the pavement were widened to 24 feet and lateral restrictions removed the capacity would be increased to about 530 vehicles per hour or more than 50%. This relatively simple construction expedient might then relieve traffic congestion on this route a sizeable number of hours in the year, an obvious advantage.

For streets, the factors which determine capacity are much more complex than for rural roads and much remains to be learned. Again a simple statement of fact will serve to emphasize the point which is being considered. One such fact is that on a relatively narrow street—say, 20-foot width—with no parking permitted the capacity for *one-way operation* is approximately *twice* the capacity for *two-way operation*, all other things remaining the same and assuming that the two-way street

carries from 50 to 60 per cent of the traffic traveling in the one direction, the usual situation. This simple fact, and others, when properly applied can serve to tremendously increase the capacity of existing city streets.

Thus, a basic understanding of the factors affecting highway and street capacity can greatly aid the official or engineer who is not a traffic specialist in making more efficient use of the highway or street system which he already has.

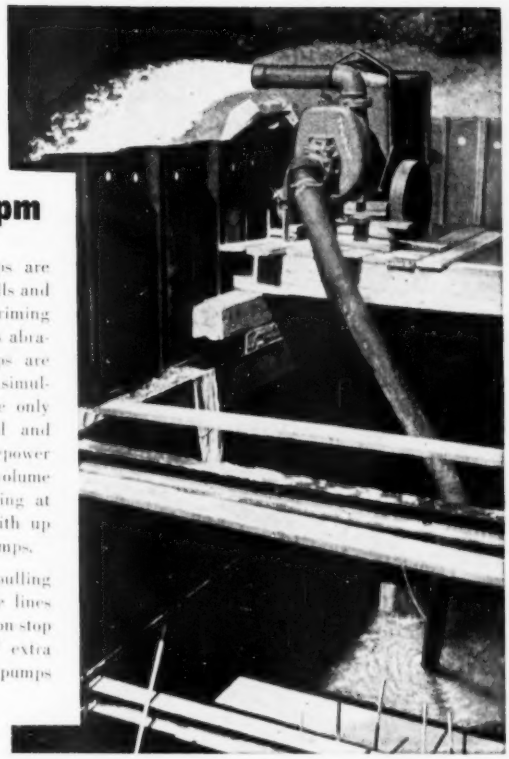
Inter-American Highway: Interest was stimulated again in the Inter-American highway by the presentation of a discussion of its problems and progress by E. W. James of the Bureau of Public Roads at the recent ARBA meeting. This is the road which, when completed, will provide an all-weather route almost 3200 miles in length from the Rio Grande to Panama. As of last June, the route was more than 92% complete—entirely complete in Mexico. Principal gaps remaining are 25 miles in Guatemala, 212 miles (14 of which are passable in dry weather) in Costa Rica and 14 miles in Panama.

Aside from its tourist appeal, completion of the remaining sections is of vital importance to agricultural and industrial progress, and general economic well-being of the Central American countries.

From Here and There: A German engineer has come up with a chemical which, when mixed with the bituminous material used in forming a highway surface, is expected to keep the pavement completely free of ice and snow, even at very low temperatures. As reported in "Automotive News", the Indiana State Police have suggested that consideration again be given to the use of safety belts to reduce the number of fatalities and serious injuries resulting from automobile crashes. Seems appropriate, especially for some of the characters we have seen "flying low" around these parts. I don't suppose the matter is finally settled, but a court referee has ruled that bids must be taken on both asphalt and concrete pavement designs for the Ohio Turnpike.

An Aside: Our campus is currently swarming with people from industrial concerns and some government agencies recruiting engineers from the spring graduating class. So far, not a single highway agency has even inquired about the possibility of attracting men from this class. 'Nuff said.

Jaeger's bigger pumps pull stronger at easy 1200 rpm



Jaeger "Sure Prime" Pumps are built oversize with larger shells and impellers. They hold more priming water and are subject to less abrasive wear. These big pumps are designed with 2 independent, simultaneous priming actions, the only positive self-lubricating seal and engines of the largest horsepower applicable. They deliver full volume at an easy 1200 rpm, priming at only 1400 rpm compared with up to 2000 rpm for ordinary pumps.

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PUBLIC WORKS DIGESTS

THE WATER WORKS DIGEST

Use of Chlorine Controls Algae Odors

The raw water supply of the Eden Creek filtration plant, McNeil Island, Wash., is surface runoff with a high color derived from organic materials. From the middle of September to the middle of June the treatment problem is simply color removal. The rest of the year the problem is the removal of color, iron, manganese, and odors caused by algae, chiefly Anabaena, which appears regularly each year when the water reaches 14° C. Various uses of chlorine, chlorine dioxide, sulphur dioxide and aeration have demonstrated that any odor caused by algae can be eliminated by use of chlorine. The chlorine dosage must be maintained high enough to destroy all odors at 80° C. The chlorine reaction time must be at least six hours for the Eden Creek water. This reduction time can be reduced by the addition of chlorine dioxide. The finished water must be aerated to a constant pH. For this water, between 1/3 and 1/2 cu. ft. of air is required per gallon of water. Manganese can be removed by coagulation with an alum floc at a low pH value if it is previously oxidized by the application of chlorine dioxide.

"Chlorine and Chlorine Dioxide for Control of Algae Odors," by C. R. Harlock, Supt., and M. R. Dowlin, Operator of Eden Creek plant. *Water & Sewage Works*, February.

Cleveland's New Filtration Plant

The Nottingham Filtration Plant of Cleveland, O., which went into service in September, 1951, contains several unusual features. The most noticeable is the operating floor. The 24 filters are arranged in two rows with a filter gallery between, as is common, but the filters are separated from the gallery by double-paned thermal-type glass. This confines the moisture to the filters, keeps the operation area dry, and, as the area back of the glass is heated only enough to keep the temperature above freezing, less heat is required. The gallery has a show-window appearance.

After flocculation, the water goes to four parallel-flow two-story settling basins, from which the sludge is removed either by draining and washing it with fire hose, or by scraping with a small bulldozer. It is believed to be the only 2-story basin in the country that uses a bulldozer for this purpose.

Six vertical turbine-type pumps move the raw water to the filter plant through two 72-in. pipes, on each of which is a 72 x 36 in. venturi meter with 42-in. cone valves. A cone check valve is placed on the discharge of each of the 14 filtered-water centrifugal pumps, and each pump has a butterfly valve on its suction.

There are eight rooms for storing activated carbon, each of which is equipped with a fire-detecting system and an extinguishing system using carbon dioxide. Each of the three chlorinators is equipped with a chlorine flow recorder and operational alarms. A control panel in the superintendent's office indicates the pumpage, filtered water level, wash water rise etc. and the residual chlorine for flocculated water, settled water and filtered water. Control panels in the pump building, the chemical feed room and the filter office indicate all details of the operation, and many of them record them.

"At Last Plenty of Water for Cleveland," A. A. Burger, Cons. Engr.; *American City*, February.

Coatings for Steel Water Pipe

Experience and tests on many types of coatings have established that: protective coatings, to be permanent and economically justifiable, should have substantial thickness; and must be properly applied to steel surfaces that are in proper condition to receive it. Asbestos felt wrappers, mortar coating shields, or their equivalents so greatly increase the service life of coatings as to be worth far more than their cost. The most common linings now in use for water lines are cement mortar and coal tar enamel; but other materials, such as phenolic, vinyl, thikol and neoprene offer good possibilities. Coal-tar enamel linings should have a penetration of at least 7 as applied.

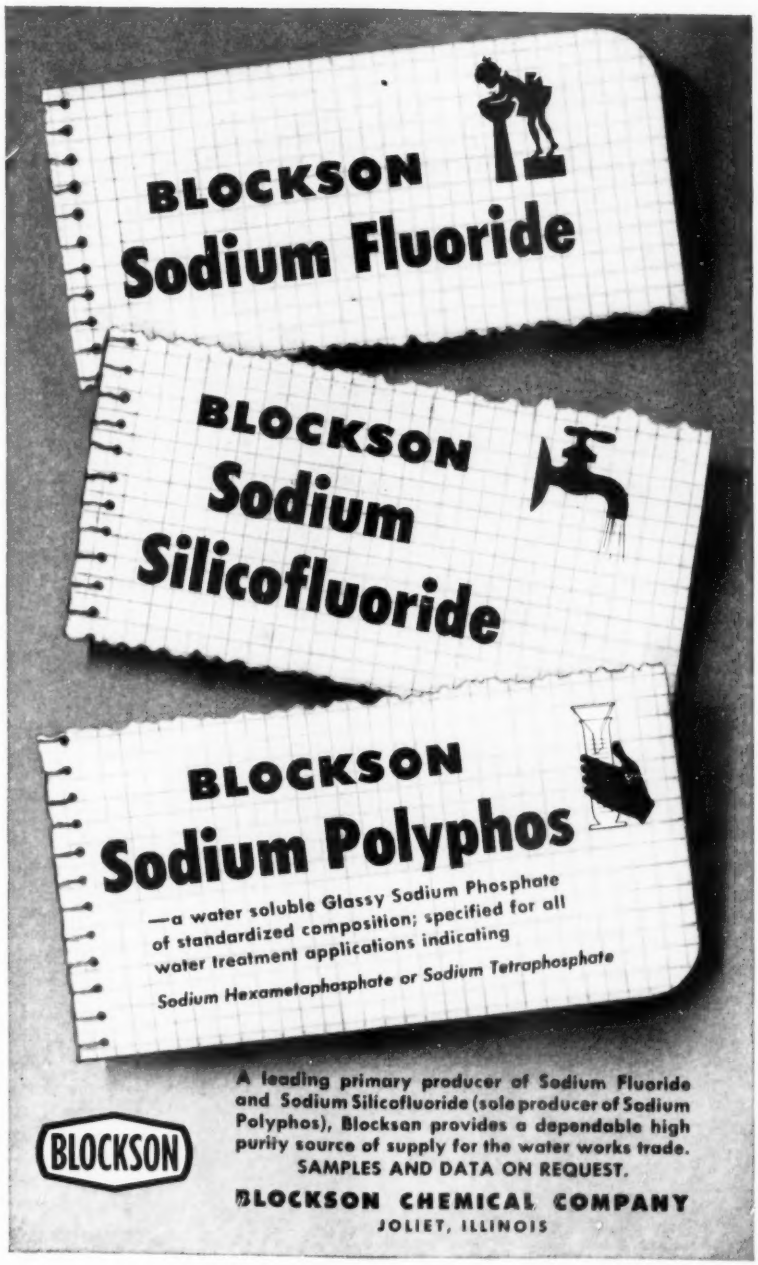
A coating should be chemically inert to the soil, air, water, bacteria, and vegetable conditions encountered; chemically neutral to the pipe steel, and remain stable indefinitely. It should resist physical abuse during handling; should bond tightly to the steel; as applied, it should permanently waterproof the pipe so that not more than 0.25% by weight of moisture is absorbed into the coating during a period of 250 days. The sustained electrical resistance of the coating should be at least 100,000 ohms per sq. ft. of surface. The two most important characteristics are resistance to water penetration and to deformation.

For wrappings, rag felts, cotton, burlap and other organic materials are not considered permanent. Mortar coatings and asbestos felts give excellent results. The relatively new cold-applied plastic tape has given very favorable test results but is somewhat expensive as yet.

"Coatings for Steel Water Pipes," by Walter R. Cates, Sec'y, Steel Water Pipe Mfrs. Tech. Advisory Comm. *Journal, American Water Works Ass'n*, February.

Cement-Mortar Linings And Coatings for Steel Pipe

Many years experience with lining 150 miles of steel pipe of all sizes up to 67-in. has convinced the author that cement-mortar fulfils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most of the requirements of linings and coatings. A permanent Hazen-Williams C of 145 could be safely assumed for a steel pipe properly lined with cement-mortar and carrying water of normal pH. The only apparent weakness of cement-mortar coatings is that electric current can pass through and disintegrate it if the ground is wet and particularly if the ground water contains salts in solution.

"Cement-Mortar Linings and Coatings for Steel Pipes," by R. C. Kennedy, Chf. Engr., East Bay Municipal Utility Dist. *Journal, American Water Works Ass'n*, February.

New Ion-Exchange Resins in Water Treatment

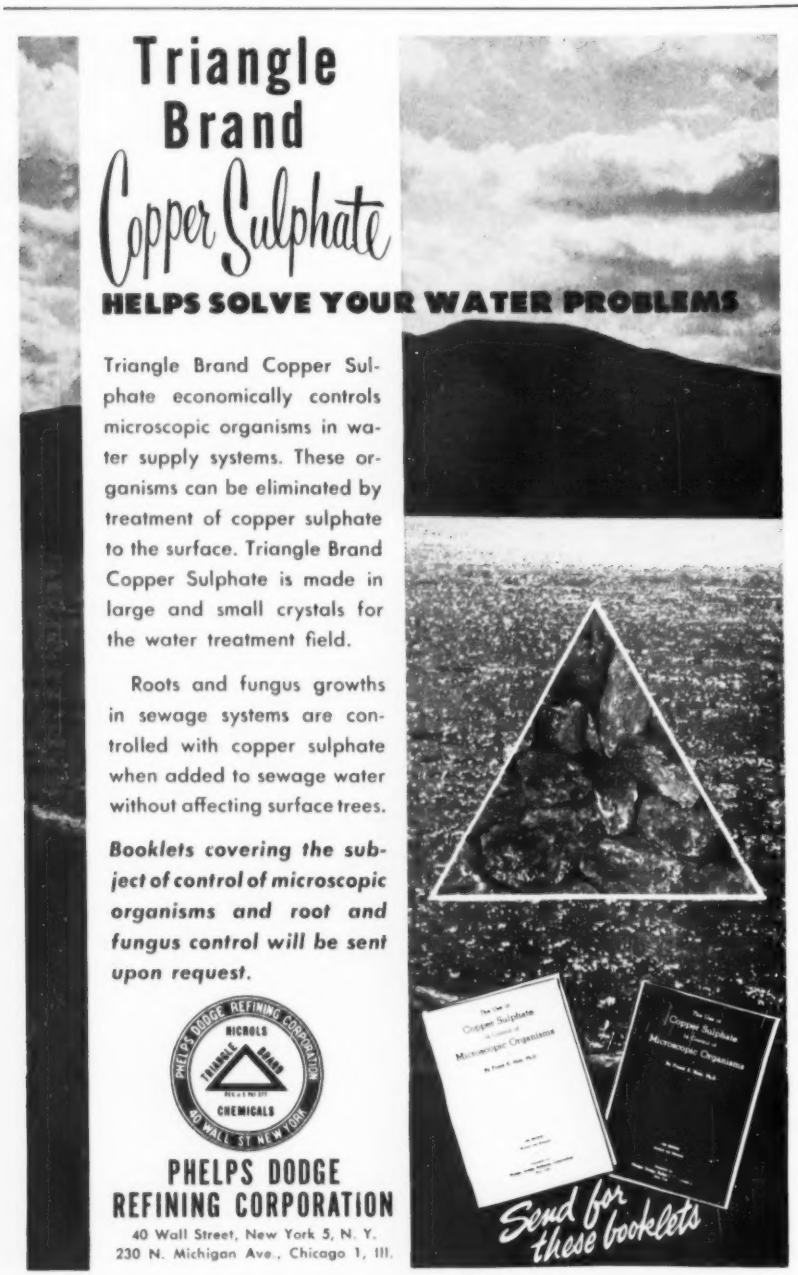
For water softening, cation-exchange resins operating on the sodium cycle have three principal advantages over precipitation methods —(1) Initial cost of equipment is low; (2) A soft water of constant quality is produced regardless of variations in influent-water composition; (3) The cost of treatment by ion exchange may be lower. The substitution of a strongly basic anion-exchange resin for the cation exchange normally used in water softening points to a simplified method of removing fluorides, excessive alkalinity and sulfides. Fluorides can be removed effectively by use of a strongly basic anion-exchange resin in the chloride form. The dealkalization of water by use of the chloride form of a strongly basic anion-exchange resin eliminates fear of introducing acid to the water and no handling of acids is necessary, nor degasification equipment, regenerant cost is low, and essentially constant alkalinity is maintained. By combining, unmixed, an anion-exchange resin in the chloride form with a cation-exchange resin in the sodium form, some waters may be dealkalized and softened in a single column. Both resins are regenerated with brine.

The methods commonly employed for the reduction or removal of sulfides from industrial waters are aeration and chlorination. Aeration alone will reduce sulfide concentration to a range of 1-2 ppm, while chlorination will effect complete removal; free sulfur will be formed and may have to be removed by filtration, the complexities and cost of which methods generally prevent their use in domestic systems. The use of a strongly basic anion-exchange resin in the chloride form shows promise; for regenerant, if the water has a pH of more than 8.0, salt alone may be used, below 8.0 a solution of 90% salt and 10% sodium bicarbonate is recommended; and below 7.0, sodium bicarbonate only.

"Ion-Exchange Treatment of Water Supplies," by Joseph Thompson and Francis X. McGarvey, of Rohm & Hass Co. *Journal, American Water Works Ass'n*, February.

Selection of Pumping Equipment

The proper selection of pumping equipment must be based on thorough analysis of the rates at which water is to be pumped; determination of heads throughout the range of operating conditions; information from manufacturers on the types, sizes, and characteristics of equipment that can be furnished; consideration of the desires and preferences of the operating personnel; determination of the best type of equipment for the job, and of the proper number of units and their hydraulic characteristics. Also, such features of the design and manufacture of the units as speed, bear-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ings, lubrication, ease of maintenance, testing operations and procedures should be investigated and specified.

"Selection of Pumping Equipment," by Thomas M. Niles, Consulting Engr., *Journal American Water Works Ass'n*, February.

Television and Water Consumption

The operators of Toledo's water works were worried. Every evening the pumping load would at intervals jump up—sometimes 25 or 30% within 5 min.; and when an additional pump was put into service to meet the demand, it would as suddenly fall again. The pumping station record showed that most of these jumps occurred on the hour and half hour. There did not appear to be any commercial use, confined to evenings, to account for it. What activities of the domestic consumers during the evening were changed at half-hour intervals? Television seemed to be the answer. This was confirmed when the consumption curves were compared with the television programs. The biggest drop occurred when "I Love Lucy" came on, and the jump back when that program terminated 30 min. later. The next biggest jump coincided with the T. V. Playhouse hour, with Ed. Sullivan third on the list. Apparently when a favorite program came on, members of the family stopped washing dishes and any other water consuming-activities; and when it ended they went at once to sink, tub or toilet. The possibility of using water-pressure records for rating TV programs may suggest a possible source of additional revenue for water utilities.

"Using Water Demands to Rate Television Programs;" by George J. Van Dorp, Water Commissioner, Toledo. *PUBLIC WORKS*, March.

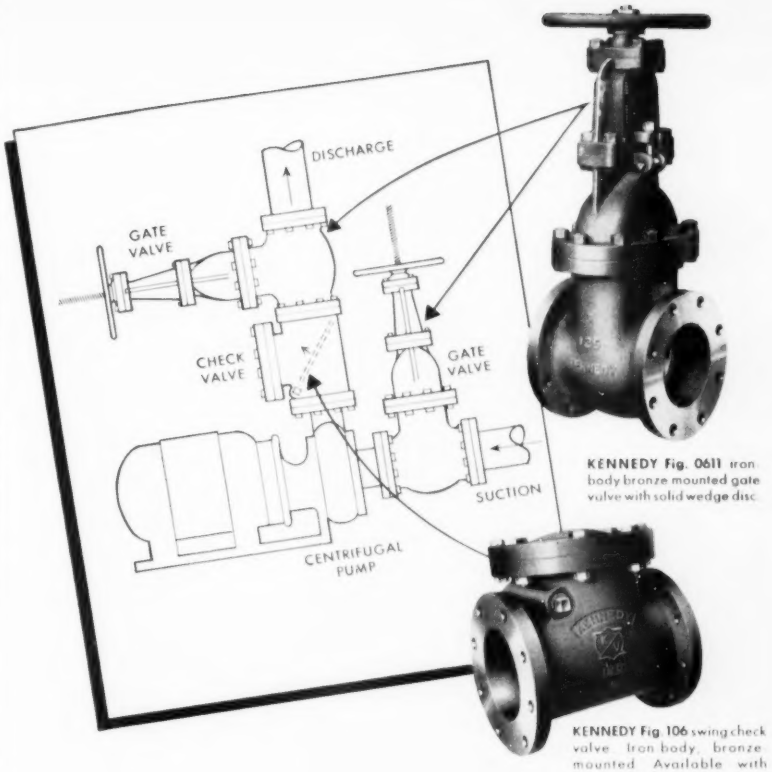
• • •

Stream Classification

(*Continued from page* 83)

the designated best use and is captioned an R 1 zone: Recreation, Bathing. The quality standards applicable to all waters in R 1 zones are those assigned to Class B waters.

Only a limited number of regulations are given herewith as their purpose is to illustrate the method of applying and incorporating the classification or quality standards data into the rules and regulations for a specific stream or water body. The values included in the illustrative regulations are not to be con-



KENNEDY Fig. 0611 iron body bronze mounted gate valve with solid wedge disc

KENNEDY Fig. 106 swing check valve. Iron body, bronze mounted. Available with bronze, leather or iron discs

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strued as representing acceptable standards for the usages indicated.

WS 1 Zones: Water Supply, Domestic—The following regulations shall apply to waters in all WS 1 zones:

A. Best Usage Designation: Source of water supply for domestic consumption; accessory uses; any other uses.

B. Determinative Conditions: The waters after disinfection shall meet the U. S. Public Health Service drinking water standards.

C. Standards of Quality: The quality standards specified for Class A waters as given herein shall apply.

1. Physical quality standards: No floating solids, settleable solids, oil, sludge deposits, tastes or odor producing substances attributable to sewage, industrial wastes or other wastes.

2. Chemical quality standards: (a) pH range between 6.5 and 9.0; (b) Not less than 5.0 ppm dissolved oxygen; (c) No toxic substances, other wastes, or heated liquids alone or in combination with other wastes in quantity or physical condition to impair the waters for the designated best usage or accessory uses, as determined by the Water Pollution Control Board.

3. Bacteriological quality standards: In any series of samples the median most probable number (MPN) of organisms of the Coliform group shall be less than 50 per 100 milliliters.

R 1 Zones: Recreation, Bathing—The following regulations shall apply to waters in all R 1 zones:

A. Best Usage Designation: Bathing; accessory uses; any other usages except domestic water supply.

B. Determinative conditions: None.

C. Standards of Quality: The quality standards specified for Class B waters as given herein shall apply.

1. Physical quality standards: No floating solids, settleable solids, oil, and sludge deposits attributable to sewage, industrial wastes or other wastes in such quantity or physical condition so as to impair the waters for the designated best usage or accessory uses as determined by the Water Pollution Control Board.

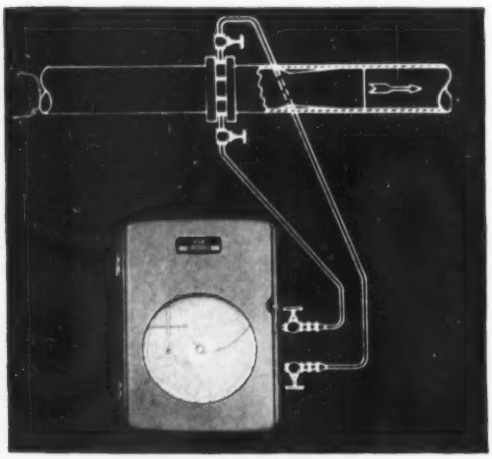
2. Chemical quality standards: These are the same as for WS 1.

3. Bacteriological quality standards: During the bathing season, in any series of samples the median most probable number (MPN) of organisms of the Coliform group shall be less than 10 per 100 milliliters.

Under the heading of supplementary regulations are all provisions that are applicable to more than one type of zone. Their inclusion under a separate section saves repetition under each zone affected. These regulations may include provisions relating to test procedures, terminology, inconsistencies, and related data.

Administrative Aspects

The administration of regulatory measures is generally referred to as a negative art because of the prohibitory content. The administrative official will be called upon to make investigations of violations, to issue and deny permits, and perform associated duties. No stream zoning plan will be so ideal that adjustments will not be required. The proper handling of situations in which the application of the letter of the regulations would be arbitrary or confiscatory will be an important aspect of the administration of the water use zoning regulations. The effectiveness of any particular stream zoning will de-



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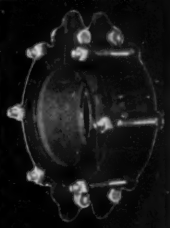

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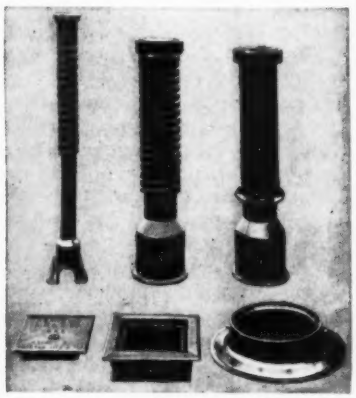

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pend upon the thoroughness of the studies pertaining thereto; proper evaluation of existing conditions and future trends; the preparation of regulations that are particularly applicable to the situations involved; and intelligent and impartial administration of adopted rules and regulations. The regulatory measures should contain a section designating the official who is to enforce them and also a general rule of conduct that he must follow. This latter provision is of considerable value to the administrative officer in his relationships with the public.

It is axiomatic that the rules and regulations should meet the criteria of clearness, conciseness, and completeness. In many states, there are interstate commissions or other agencies dealing with the pollution problems of interstate waters. The question of which agency has superior jurisdiction when the same waters are involved is inevitable. There are also many laws enacted pertaining to water use which may differ with the requirements contained in the rules and regulations. This can be satisfactorily adjusted by a concise provision to the effect that where there is any conflict with another statute, ordinance or regulation, the most restrictive requirement, or that imposing the higher standards, shall govern.

For effective administration of the stream zoning regulations, the administrative official must have some means of determining if any proposed stream usage will comply with the provisions of the rules and regulations. The control is secured by utilizing a permit system for all matters that affect stream usage within the jurisdiction of the Board. The construction of new sewers, sewage treatment plants and industrial waste treatment facilities, and changes or additions to such existing facilities are proper subjects necessitating permits.

Certificates of Use

Some means of administrative control are essential to insure that facilities constructed under a permit have been built in accordance with the approved plans and conditions contained in the permit. After inspection and as evidence of compliance a Certificate of Use may be issued. A Certificate of Use should also be issued to all users that have been classified and recorded as nonconforming uses. In the former case, this certificate protects the permitee, serving as proof that the facilities have been inspected and lawfully approved for use. In the latter

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instance, it is evidence that a use is a lawful nonconforming use.

Nonconforming Uses

In many cases, usage of waters will be found that are contrary to the regulations. This is in the very nature of the pollution abatement program. Such situations are termed nonconforming uses and the problems related to them may arise from a number of situations.

All uses that contravene the prescribed standards that are an actual or potential health hazard should be required to cease such pollution upon service of the final order by the Authority. However, those violators where the fouling of the stream does not constitute a health hazard should be given a reasonable leeway in arranging for elimination of their nonconforming use.

A situation may occur in which an industry discontinues operation so that a nonconforming stream use also ceases. If the same firm recommences operations during the time period allowed for conformity, it may be permitted to continue its former discharge until the date designated in the original order. However, if the operation is not resumed within the original time period, even though the same firm wishes to resume operation, it should be required to conform to the standards imposed. Operation by a new business or corporation should be in conformity to the use standards established.

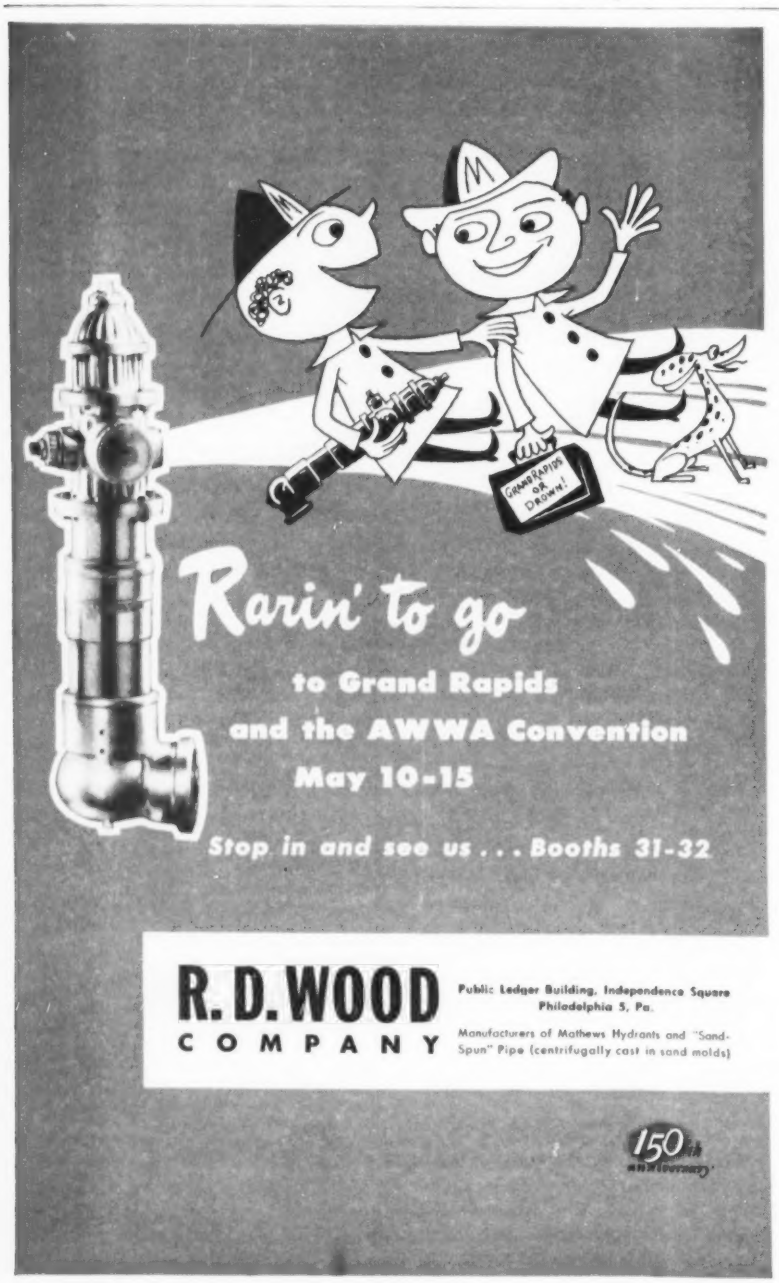
If a catastrophe such as a fire, flood, or similar occurrence destroys an industrial establishment that has been allowed to continue the discharge of polluting wastes for any reason, such establishment, if rebuilt, should be required to conform or meet the standards prescribed. This requirement remedies nonconforming usages as changing conditions permit. An owner cannot claim that he has an additional period in which to discontinue the discharge of sewage, industrial waste or other polluting substance. Generally, land use regulations permit rebuilding of nonconforming structures if damage is less than 50 percent of its value. A similar limitation on reestablishment of a nonconforming stream use may be desirable.

When an industrial or other establishment which is classified as a nonconforming user changes ownership, all the requirements and restrictions of any order issued by the Water Pollution Control Authority should be enforced as if it were a continuous ownership, and no extension or postponement will be allowed. Writing such a provision directly into the regulations eliminates a possible point of misunderstanding and facilitates administration.

Any change in use by an industry or other user that is nonconforming should be to a conforming use. This would require that the stream standards in effect would have to be met without any intervening period between the establishment of the use and compliance. This situation will normally be controlled by the permit requirements.

If a zone is changed to a more restricted use so that higher quality standards are imposed for the use of such waters, all users of the stream are subject to the regulations pertaining to the more restricted use. Any uses that are made nonconforming by such action must be governed by the rules applicable thereto.

Whether or not the enabling act specifies that an official record is to be made of all uses of the streams that violate the prescribed standards, it is advisable to prepare such an inventory and file it with the rules and regulations or as provided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for by law. Such an inventory is essential for administrative control purposes. The record should include the following as a minimum: Names and addresses of the owners of such nonconforming use and of any occupant other than the owner; the legal description of the premises involved; and the nature and extent of the nonconforming use.

Provision for Appeals

It is essential and exceedingly important that provision be made for appeals by persons aggrieved by a denial or revocation of any permit or by any decision of the water pollution control agency. The functions of such a board would be (1) to hear and decide all matters referred to it with respect to interpretation of the rules and regulations; (2) to review, upon appeal, any order, requirement, decision or determination made by the administrative officer enforcing the regulations; and (3) to grant permits or certificates of use, under conditions specified in the rules and regulations. Every decision of the Board of Appeals should be subject to review by certiorari.

In its interpretation of rules and regulations, a Board of Appeals is given the authority to grant variances from a literal application of the rules and regulations where, by reason of practical difficulty or peculiar circumstances, unnecessary hardship would result. The interpretation of the "practical difficulty and unnecessary hardship" clause must, however, not be simply a circumvention of the legal restrictions.

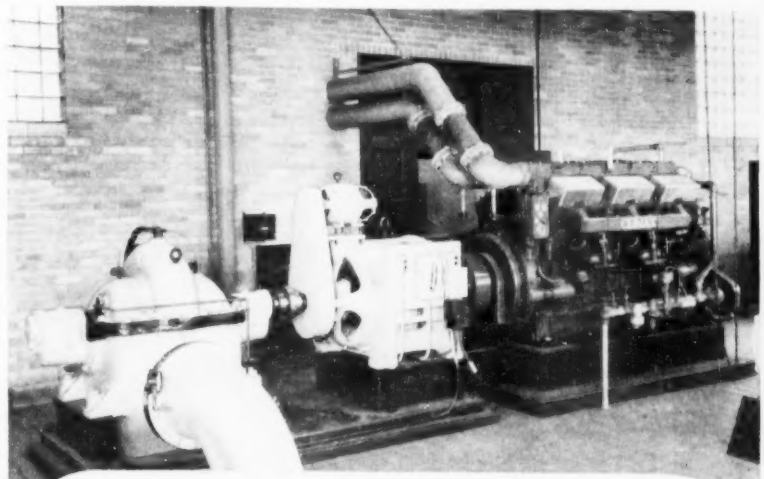
For example an industry might show that its profits would be reduced by a requirement to install complete industrial waste treatment facilities prior to discharge of the effluent into a water body that necessitated such treatment. Diminution of profit or cost in itself cannot be construed as constituting unnecessary hardship. On the other hand, if an industry that is a substantial portion of the economic base of a community would have to go out of business because of its financial condition and the cost of ordered treatment facilities, thus depriving a considerable number of people of employment, unnecessary hardship might properly be grounds for granting a variance from the order.

An illustration of practical difficulty is where no adequate or practical method of treatment or disposal is available. Similarly in states where tax limits prevail, it may be impossible for a municipality to finance the ordered treatment works because of existing indebtedness. Granting variances or modifications of any order under the above situations could be considered a proper exercise by the Board of Appeals of its power to grant variances.

In the case of a Board of Appeals such variances are granted in passing upon appeals. The applicant must follow the established administrative procedure of applying to the enforcing official for a permit or for relief from an order or determination of the Board. Upon denial the matter comes before the Board of Appeals.

The Board of Appeals may also be given authority to grant variances in cases enumerated in the regulations and in accordance with specific rules applicable thereto. An illustration is the granting of a conditional certificate of use for a limited period.

It is thus seen that the Board of Appeals may grant variances under two separate and distinct types of jurisdiction. The practical difficulty and unnecessary hardship field is characterized as the appellate jurisdiction. Where cases are itemized in the rules and regulations as special exceptions under specified rules of



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conduct, they are considered as matters of original jurisdiction.

Summary

Experience with land use zoning has amply demonstrated the great value of a discretionary board that can ameliorate the strict letter of the law by granting variances under exceptional conditions based upon environment or for special items enumerated in the regulations. Furthermore, it is through such a discretionary board acting under a rule of conduct prescribed by the legislative body that the courts are made a part of zoning machinery.

With the existence of a Board of Appeals a plaintiff who is aggrieved by an order or determination of the Water Pollution Control Board must exhaust the remedy afforded him by law before he may challenge the legislation on constitutional grounds. The flexibility afforded the administration of the regulations is an additional reason for having a Board of Appeals. Such a Board may consist of three to five members, appointed by the Governor or a superior authority to the Water Pollution Control Board.

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• • •

Civil Defense

(*Continued from page* 66.)

importance, it is also important that adequate fire service supply be provided to combat major fires which might be expected in target areas. The Governor's Defense Council has advised that a study be made to plan for an adequate emergency water supply system for fire protection in the Boston Metropolitan area and in the vicinity of other prime targets. The study will include investigation of auxiliary water supplies adequate in quantity for fire protection purposes and determinations of the quantity of water which should be provided for such purposes in the event of a major conflagration. The study will include also the development of a practicable and comprehensive plan for the provision in such an event of adequate emergency water supply for fire fighting purposes, including general plans and description of necessary works, structures, or equipment. A contract has been negotiated by the Civil Defense Agency with a reputable engineering firm to conduct this study.

Mutual Aid — Emergency Personnel and Equipment — The Massachusetts laws and directives for Civil Defense include provision for mutual aid between municipalities within each of the nine regions in the Commonwealth and also for the dispatching of aid from one region to another. In order that information may be available as to the emergency water supply resources an inventory has been made of all emergency water supply equipment and personnel. Such information will be made available to the State and Regional Civil Defense Directors to facilitate procurement and dispatch to areas where such emer-

gency equipment and personnel may be needed.

From the returns of these inventories, it is apparent that very few municipal water supply authorities have thus far enlisted or trained auxiliary personnel. This condition merely reflects the difficulty in interesting the general population in problems of Civil Defense. How to overcome this difficulty and to secure adequate planning and preparation is now one of the major problems of the Civil Defense Agency in the absence of an actual disaster which would arouse the population to activity.

Mr. Kingsbury is a sanitary engineer in the Massachusetts Department of Public Health and is acting as Liaison Officer, Environmental Sanitation Section, the Medical and Health Division, Massachusetts Civil Defense Agency.

• • •

Sidewalk Patching

(Continued from page 67.)

of the Binder. The mixture was then troweled into place and, when set, was topped with Wearcoat.

As the material required troweling and we had no experienced cement finishers on our crew, we were undecided as to whether or not the work should be let by contract. However, as the test panels installed by our crew seemed satisfactory for a first attempt, we decided to let them go ahead hoping that with experience they would gain speed. As it turned out we were well pleased with their work.

With the type of material decided upon as well as the method of handling, the next step was to help finance the project. My first step was to approach several business firms whose sidewalks were in bad shape and lay this proposition before them: Would they pay for the cost of the materials if the city would furnish the labor?

The results were gratifying, with forty percent of the material cost being offset in this manner. A higher percentage would have been obtained had we so desired; but in cases where only a hundred or so feet were involved, and the depth was not too great, the property owner was not approached.

Our breakdown of costs was as follows: A total of 16,000 square feet of sidewalk was resurfaced. The material cost averaged 8 cents per square foot and labor 12 cents. The depth of fills varied from $\frac{1}{8}$ inch to better than two inches, with the average fill somewhat greater than $\frac{1}{4}$ inch. On a quarter-inch basis the material used would have resurfaced approximately 26,000 square feet. Fortunately, on all areas requiring the deeper fills we were successful in getting the cooperation of the property owner in paying for the material.

More work is being planned for this summer and we expect our labor cost to be much lower due to the fact that we now have an experienced crew. An interesting comparison on cost is that estimates given me by contractors ran from thirty-five to forty cents per square foot.

Several nearby towns with tight budgets have made inquiries as to our program. One of them—Wapato, Washington—installed a 600-ft. test panel with the property owners financing the material bill.

But regardless of the method of financing, the non-slip and resilient surface this mastic has provided has gained the whole-hearted support of one group in our city who are considered experts on sidewalks—our mailmen.

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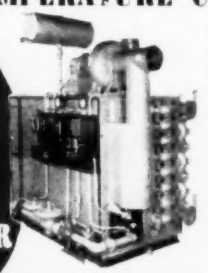

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PUBLIC WORKS DIGESTS

THE SEWERAGE AND REFUSE DIGEST

Removal of Toxic Metals by Sludges

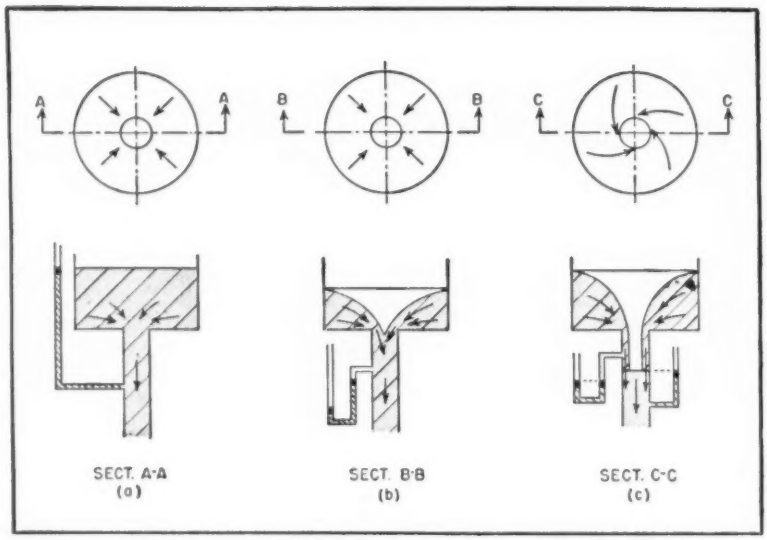
On the basis of extensive studies made to determine the ability and efficiency of activated sludge, fresh solids and ripe sludge to remove copper, zinc and chromium from sewage, it was concluded that such removal is readily effected, the extent of the removal being a function of the concentration of the sludges, the contact time, and the character of the sludge. This removal is not due to an inorganic zeolite, but the agent primarily responsible is the organic matter in the sludges. The type of the organic matter has a direct bearing on the amount of metal removed.

"Removal of Toxic Materials by Sewage Sludges;" by Willem Rudolfs and A. L. Zuber, Rutgers Univ. *Sewage and Industrial Wastes*, February.

Flow Characteristics Of Pipe Sewers

Flow characteristics and n of 8-in. sewer pipes, both vitrified clay and asbestos cement, were determined as a project of the Ohio State University Research Foundation. Each line tested was 300 ft. long, and they were set accurately at grades of 0.25% and 0.40%. 6-in. wyes were placed at about 25-ft. intervals. Tests were made with various depths of flow, from 1 in. to flowing full under pressure. Only the middle 140 ft. of the pipe line was considered in the calculation. The values determined for n were all between 0.0085 and 0.012; with an apparent tendency to increase as the slope was increased. The study indicates that the roughness coefficient for the two materials is the same. It was the writer's opinion that after use in a sewerage system, all kinds of pipe will become coated with slime and the coefficient will be a measure of the slime coating.

"Flow Characteristics and Roughness Coefficients of Sewer Pipes;" by Kenneth W. Cosens, Asst. Prof. of Civ. & San. Eng., Ohio State Univ. *Public Works*, March.



Courtesy Engineering News-Record

● **THREE variations of inlet flow studied in drop manhole design.**

Designing Drop Manholes

The extensive intercepting sewer system being built in Pittsburgh by the Allegheny County Sanitary Authority runs deep below the surface, in places as much as 90 ft. below the sewers intercepted. The sewage drops into the interceptors through vertical shafts, and the design of these presented a problem. To assist in solving this, studies were conducted in the laboratories of Carnegie Institute of Technology, chiefly on the entrances at the top of the shaft. Three types were studied (see illustration)—1—flooded entrance, practicable only under certain conditions of discharge and pressure in the tunnel below, 2—radial entrance, in which negative pressures generally occur at the top of the shaft. 3—spiral entrance, with an air hole down the center of the shaft approximately to the point where the tunnel hydraulic grade line intersects the shaft. The spiral flow works best and was adopted by the Sanitary Authority. The strong vortex motion eases the water down smoothly against the sides of the shaft with considerable dissipation of energy. No negative pressures or danger of cavitation occur.

Results of the tests show that to produce a smooth, strong vortex, the inlet tanks should be circular with the water entering tangentially through a full-depth slot. The diameter of the tank should be from 4 to 6 times the diameter of the shaft—the larger tanks being preferable hydraulically. The width of the inlet slot should not be less than three-quarters, but not more than the diameter, of the shaft.

"Studies Show Pittsburgh How to Drop Sewage 90 Feet Vertically to Tunnel Interceptors;" by L. M. Lanshey, Assoc. Prof. of Civil Eng.,

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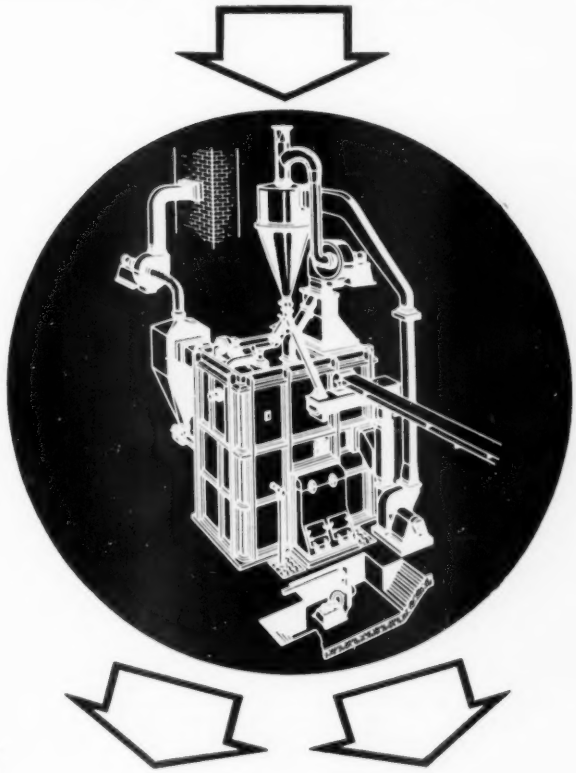

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Carnegie Institute of Technology. *Engineering News-Record*, March 5.

Modifications of Activated Sludge Treatment

Two modifications of the activated sludge process have been adopted for New York City's treatment plants to secure substantial degrees of treatment in compact plants on small areas. These are "step aeration" and "modified sewage aeration" also called "high-rate activated sludge." Both are based on the concept that the quality and characteristics of activated sludge are determined by the "sludge age" or period of circulation under air. Step aeration aims to produce a quality product of full activated sludge in a smaller aeration tank; modified sewage aeration, to produce a workable result with low air use, heavy excess solids, with perhaps a less perfect effluent, in a smaller aeration tank; in other words, an economical process of intermediate purification. In step aeration, the same amount of sludge is circulated within the system as in conventional plants, but by diluting the return sludge with sewage at several different points much heavier concentrations are maintained in the first part of the tank than at the effluent end, and equally as good effluents are obtained with one-half as great aeration tank capacity.

Modified aeration is identical in flow plan to conventional activated sludge, but it utilizes activated sludge in its initial stage of development. Instead of being held under air for 3½ to 4 days, the period with normal sewages is reduced to 0.4 day in cold weather to 0.2 day in hot weather.

"Sewage Disposal Problems in World's Largest City;" by Richard H. Gould, Director, Div. of Sew. Disp. *Sewage & Industrial Wastes*, February.

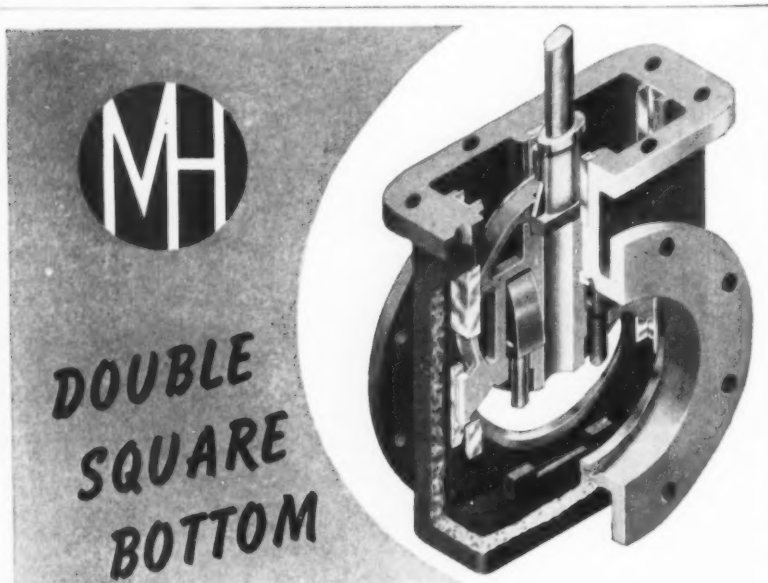
Prohibiting Feeding Raw Garbage to Swine

Recent nation-wide epidemic of vesicular exanthema, a swine disease attributed to their being fed raw garbage, has caused a number of states to adopt laws or regulations prohibiting this. Illinois and Nebraska have recently taken such action, and Florida, Georgia, Kentucky, New York, Oregon, Washington and Wyoming had previously done so; and 15 to 20 other states are considering such legislation. It would appear that many municipalities where hog feeding is practiced will have to adopt some other method of disposal.

"Many States May Bar Feeding Raw Garbage to Swine;" *PUBLIC WORKS*, March.

Slaughterhouse Waste Digestion

Slaughterhouse waste consists of blood, manure, flesh, fat, offal and other suspended matter. The general composition is: total solids, 3500 to 4500 ppm; BOD 1000 to 2250 ppm; total nitrogen 100 to 300 ppm. Experiments with treating the nonsettleable material in digestion tanks showed that the waste must be adequately mixed or properly distributed through the seed sludge. It may be mixed for a short period several times a day or by a continuous upflow method. Using the latter method, the degree of purification can be regulated to obtain 95% or more BOD reduction at 95° F in 1.1 days detention period, or at 70° with 2.25 days detention. Acclimatized seed sludge withstands shock loads without difficulty. Upflow digesters produce better results than batch digesters.



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"Slaughterhouse Waste Digestion;" by Willem Rudolfs and V. Del Quercio, Research Ass't, Rutgers Univ. *Water & Sewage Works*, February.

Sludge Mixtures And Vacuum Filter Rates

At Baltimore's Rack River treatment works, a mixture of four types of sludge—primary settling tank sludge, activated sludge, humus tank sludge and secondary settling tank sludge—is digested, elutriated and dewatered on four vacuum filters. Experiments made with filtering these several sludges and mixtures of them led to the following conclusions: The addition of either raw activated or raw humus tank sludge to digested primary settling tank sludge materially reduced filtration rates. Higher filtration rates were obtained when *digested* humus tank sludge instead of raw was added to digested primary settling tank sludge. Without exception, ferric chloride was a more effective coagulant than chlorinated copperas. It was found more economical to use ferric chloride and lime as coagulants than to use ferric chloride alone.

"Sludge Filtration Studies; by C. E. Keefer, Deputy Engr., and Joseph Meisel, Sr. Chemist, Bureau of Sewers, Baltimore. *Water & Sewage Works*, February.

Sumps for Street Drainage

A street intersection in El Segundo, Calif. presented a drainage problem in that there was no storm drainage or natural runoff. It was satisfactorily solved by installing on each side of the street a vertical 48-in. fully perforated corrugated Armco pipe 35 ft. long. A conventional curb inlet was built and connected to the pipe, which served as a sump. A cast iron ring and manhole cover were installed on the top of the sump to permit cleaning.

"Perforated Pipe Sumps Solve Drainage Problem;" *Engineering News-Record*, Feb. 26.

Harbor Pollution by Navigation Interests

The problem of eliminating waste discharges from berthed pleasure and commercial vessels is of increasing importance in New York harbor due to the improved condition of harbor waters; but it is one which has not received widespread attention. In New York harbor and its adjacent water areas, there are

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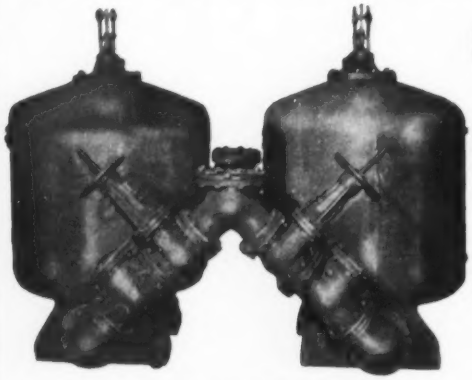

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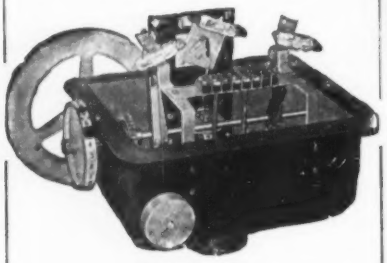

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about 15,000 inboard motor craft. It is estimated that some 10,000 ocean-going vessels berth each year in New York harbor. When these are under way, the disposal of sewage from them does not constitute a grave menace, since dilution and mixing are provided whereby the natural purification power of the water operates satisfactorily. But when these vessels are moored, the wastes are discharged into shallow water of restricted area.

The Interstate Sanitation Commission has been studying methods for controlling this pollution. For small boats, they have in mind a double-tank chemical toilet with comminutor, one tank holding comminuted sewage and disinfectant while the other is in use. Another is a closed system of toilet and aerated tank proposed by Prof. Bloodgood. For large ships, they are considering three plans—holding tanks; shipboard sewage treatment; and the collection of wastes from ship outlets and its transfer to land-side treatment plants. The last of these seems at present to be the most satisfactory.

Condensed from the *Report of the Interstate Sanitation Commission* for the Year 1952.

Effect of Stream Pollution on Fish

What is pollution from a fishery standpoint is entirely different from the sanitary engineer's idea of pollution. Moreover, different kinds of fishes vary in their tolerance for specific toxic substances. The two general types of pollution recognized in the fishery field are those that deplete the free oxygen, and toxic substances present in industrial effluents. Also there are substances that cause mechanical injury to the bodies of fishes (usually the gills), the eggs, and the food organisms. These include silt, semi-solid wastes, sawdust, etc. Another type of pollution may result from the gradual accumulation of substances that slowly change favorable fish habitats to unproductive areas.

"The Aquatic Biology of Industrial Pollution;" by R. E. Dimick. *Wastes Engineering*, February.

Common Administration Of Water and Sewage Utilities

By combining the administration of water and sewage utilities, one administrative head can be employed with broader training and at a higher salary than could be justified by two separate departments; and

this applies to the engineering personnel also. Accounting and billing can be combined. (Dallas, Texas, has three public utility rates—for water only, sewage only, and water and sewage combined. The last is based on the amount of water used, and to allow for lawn sprinkling, the water from which does not reach the sewer, the rate for June to September does not include any charge for sewage service). Combined shop facilities for both water and sewage treatment and pumping are a real economy in Dallas; it allows pooling of personnel and equipment of a higher caliber than could be afforded under separate activities.

"Sewage Works Management;" by Henry J. Graeser, Asst. Supt. Water Dept., Dallas, Texas. *Sewage & Industrial Wastes*, February.

• • •

Milwaukee Uses Copper Sulphate in Sewers

To reduce the expense of repeated cleaning of sewers in areas where tree roots are a problem, Milwaukee in 1951 started placing copper sulphate in 1091 manholes. Results from the study have not yet been reported.

• • •

How a Serious Flood Problem Was Solved

FOR years, whenever heavy rains drenched the Tennessee Valley town of Decatur, Alabama, a considerable section of the city's main business district was flooded. The drainage system of Lee Street, in downtown Decatur, was unable to handle the increased volume of water forced into it. In March, 1951, a downpour left Lee Street under 4 feet of water, with the water standing 1½ feet deep in adjacent business houses. Immediately after the flood subsided, remedial action was started.

Corrective measures for better drainage included placing an 80-inch diameter pipe 165 feet long under a part of the local L&N Railroad switching yard. The problem of installing the pipe without interfering with railroad traffic was solved by the use of Armco liner plates. These are curved flanged steel plates which bolt together to form a heavy corrugated pipe structure. The plates used on this job were 16 ins. x π long and 18 inches wide, five of them joining to form a ring or section of completed pipe 18 inches in length and 80 inches in diameter.

First, a working pit was excavated into the side of the railroad embankment, down to the invert level established for the pipe. Five rings of completed pipe were then assembled and bolted together in the open pit and jacked to the vertical side of the excavation. While this completed section of pipe was held to exact alignment and grade by 4-in. by 4-in. rails, men working inside it tunneled into the embankment, bolting additional liner plates to the head end of the 5-ring section as they progressed. The top plate was usually bolted in place first, followed by the side and bottom plates. Tunneling was done with a Cleveland clay spade and the dirt removed by wheelbarrow.

Tunneling and installation of liner plates continued in this manner until the entire 165 feet of pipe was in place. A space of only an inch or so was left between the pipe and the wall of the tunnel. Since the liner plates were bolted in place from the inside almost no outside clearance was required. After the pipe was in place, grout was forced into the space between the earth and the outside of the pipe through grout holes in special

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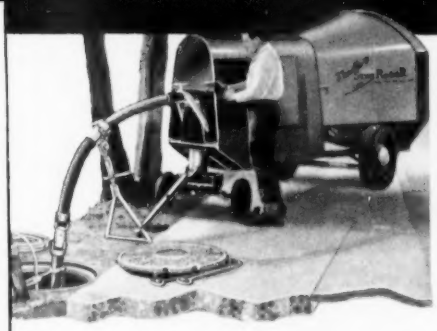

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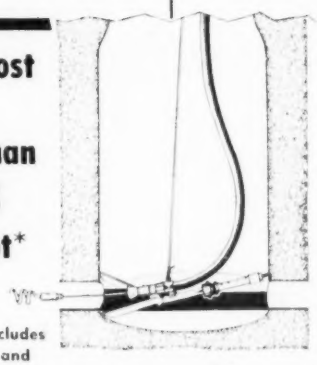

*This figure includes maintenance and parts replacement.

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top liner plates placed two to every 15 feet throughout the length of the pipe. Compressed air was used in placing the grout.

The entire operation, from the initial excavation to final grouting took slightly under eight weeks, and was completed without interfering in any way with railroad traffic. The general contractors were Holt & Thompson with Armco Drainage & Metal Products, Inc., as the sub-contractors.

• • •

City Bids on Street Work and Makes Money

Because of our small size, street jobs are not large and we have difficulty in getting contractors to bid on them. The few who do bid jump the front foot cost up to cover moving into and out of town. To remedy this situation, the Hood River Street Dep't. has inaugurated the practice of submitting competitive bids on all work. Because we are a non-profit group interested only in paving the city's streets in order to lower maintenance costs, we have been able to bid in the jobs at less than half the going contract prices by contractors in this area.

Last year we paved, and installed curbs and gutters on, two miles of streets and in 1952 an additional two miles. We retain enough profit from the work to replace equipment as it wears out and have been able to purchase a heavy-duty motor patrol, paying half the price down and charging the other half to the jobs we are using it on.

Our plan is to pave every street in town over a 5-year period. So far our plan has been very successful and from our costs, which are usually under $3.00 per front foot completed, it looks as though we will reach our goal. Also, this program helps us purchase new equipment, so that the city will be well off in this respect when our work is completed. — Carl M. Andresen, Street and Water Sup't, Hood River, Ore. (Population 3870.)

• • •

Better Drainage for a Wider Highway

FOR improving the drainage of highway US 20 southwest of Buffalo, N. Y., 28,000 ft. of vitrified clay drains were laid in connection with a project for widening the pavement. A Parsons wheel-type trencher was used for excavating the trench along the side of the existing pavement, the depth averaging about 2 ft. Gravel was spread to depth of about one inch in the trench bottom and the pipe was laid with burlapped joints and covered with gravel. Backfilling was done with an Austin-Western motor grader. Contractor on the job was Brunner Asphalt & Construction Co. of Buffalo. Cameron Ross was superintendent and engineer.

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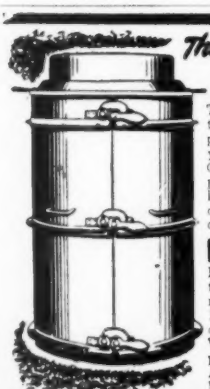

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(*Continued from page 20*)

topography of the surrounding land. . . We should define the allowable pollution loads on our water ways. We cannot afford the luxury of non-use; neither can we afford unrestricted destructive abuse."—Clarence J. Velz, Chairman, Dept. of Public Health Statistics, Univ. of Michigan.

★ ★ ★

It Really Happened- At the AWWA Meeting in K.C. last year, I introduced H.E. (Boone) Hudson, Chief Engr., Ill. State Water Survey, to Edw. R. Stapley, Dean, Okla. Inst. Tech., Okla. A & M, and I told Ed I was proud to say that Hudson was a student of mine in the 30's at the Univ. of Ill.

Ed said he knew how I felt; he, too, "was proud of some of his former students and liked to introduce them as such." He mentioned four from Cornell Univ.—"Charlie" Capen, current President of AWWA and Chief Engineer of the No. Jersey Water Dist. Comm.; E. F. (Old Blue Print Now) Filby, Cons. Engr. with Black and Veatch in Kansas City; Ernest W. Steel, Prof. of San. Engr., Univ. of Texas; and P. S. (Sid) Wilson, Mfrs. Agent in New Jersey and Metropolitan New York and super-active AWWAer in the N. J. AWWA Sect.

★ ★ ★

Names Make News — When Harry E. Jordan journeyed back to Indianapolis for the Indiana Section Meeting in February, he was "knighted 'Mr Waterworks'" and around his neck was hung a small replica of a fire hydrant suitably inscribed. It was with the Indianapolis Water Co. that Harry started his water works career as a chemist fifty years ago—and he's been AWWA Secy. and firepower for the last 17 years of these five decades.—May I add a personal word of congratulations to Harry, too?

★ ★ ★

Swedefinitions- "A physical chemist is a man who can take a thimblefull of facts, add a quart of clarifying assumptions and produce a barrelfull of unassailable conclusions"—Zounds—Know any one else that definition fits?

★ ★ ★

News Notes From Brushy Bend — The 6th Nat. Pub. Health Engr. Conf. was held at the Univ. of Fla., Mar.

24-25—Talked about Swimming Pools and Beaches, mostly.

The N.W. District of Ohio Section AWWA has scheduled a meeting for April 15 in Celina, Ohio.

Prof. Andy Anderson, at the University of Mass. has scheduled a Short School on Sewage Treatment for the first week in April.

West Virginia Sect. AWWA is exploring the possibility of holding district meetings in that state.

V.T.Y.—Doc Symons

• • •

Accelo Filter Systems

(*Continued from page 74*)

than about 2 to 1 is required, a four-arm distributor is needed. This is arranged so that only two arms will discharge at low flow rates and all four arms at maximum flow rates. Usually a two-arm rotary distributor will be the most economical, provided the capacity range is suitable. For better aeration the use of aero-spray nozzles is recommended, with the centerline of the distributor arms placed 8 ins. to 12 ins. above the level of the filter media.

The Accelo Filter system requires no greater operation knowledge or technique than is required for any conventional biological filter. The use of automatic float switches to operate the recirculation pump or the recirculation and lift pumps may eliminate manual attention to the only function not present in the conventional filter. Continuous application of sewage to the filter tends to eliminate difficulties with odors and filter flies. Inoculation of sewage, as it is applied to the filter, with fresh, well aerated filter effluent, in addition to repeated passages of the sewage through the filter, produces increased reduction in organic content of the sewage undergoing treatment.

The usual procedure in the treatment of normal domestic sewage is to recirculate 100% to 200% of the average flow rate. For the treatment of high strength organic waste, a much higher rate of recirculation may be necessary to produce the desired results and several stages of treatment may be needed.

The first plant scale Accelo Filter went into operation in the late fall of 1940. Since that time more than 100 such plants have been installed, involving a greater number of filter units.

(The terms "Accelo Filter", "Accelo Hi-Cap" and "Griductor" are registered trade names of these devices.—The Editors)

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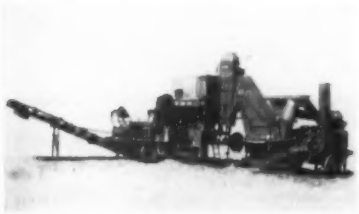
A gradation control unit, providing three or four-bin screening and separation of the aggregate after drying is now available for the Barber-Greene Model 840 asphalt plant, which has a capacity of 20 to 35 tons an hour. With this equipment, plants can comply with specifications requiring separation of aggregates into as many as four different sizes. Normally, separation is 3-bin, but a fourth bin can be added if required. The gradation unit can be towed behind a truck for easy movement. Full data from Barber-Greene Co., Aurora, Ill.



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This air compressor, in either 105 cfm or 160 cfm capacity, is designed around the Fageol Van truck unit, with the result that it is exceedingly compact. This Van truck body provides about 200 cu. ft. more payload space than other trucks of similar length and wheelbase, and the Davey compressor occupies only one quarter of the body space. Lots more room for tools and materials. Davey Compressor Co., Kent, O.

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Compressor in truck body

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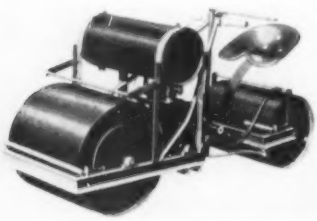

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This pressure reduction valve has been designed to maintain a very low and sensitive outlet pressure. It operates in the range from 5 psi to 260 psi and can be set to maintain a water level in a range of 5 ins. to 20 ins. The valve takes the place of float valves for automatically maintaining a steady water or other liquid level. Full data from Helco Products Corp., 2041 Colorado Ave., Santa Monica, Calif.

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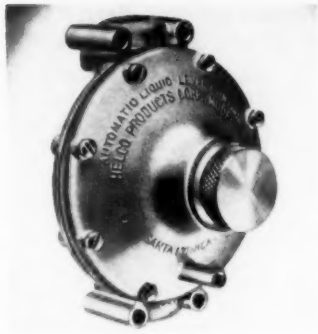

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This vacuum-type solution feed chlorinator, made of corrosion-resistant materials, with either manual or automatic proportioning control, is made in capacities up to 1,000 lbs. per day. Safety devices include a vacuum breaker to prevent flooding during shutdown. Overall housing dimensions are 20 ins. wide at the rear, 15 ins. deep and 57 ins. high. Data from Fischer & Porter Co., Hatboro, Pa.

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A completely automatic instrument for measuring smoke aspirates air at the rate of about a quarter of a cubic foot per minute through a one-inch diameter circle of filter paper which is supplied as tape from a spool. In 6 hours, plenty of material for an analysis is available. The unit is compact, easily operated and readily moved from one location to another. Research Appliance Co., Pittsburgh 9, Pa.

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Compactness is an outstanding feature of these new single-stage, double suction centrifugal pumps by Goulds. Impellers are one-piece, iron or bronze, as required, with exterior surface machined and interior surfaces hand finished. There are three different assemblies and 19 different pump sizes available, with capacities from 200 to 6400 gpm, with heads to 260 ft. More from Goulds Pumps, Inc., Seneca Falls, N. Y.

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drills 6 inches of concrete per minute
...gives lowest cost per foot of concrete drilled with a
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KONKRETE KORE DRILL
Patented core slot expels cuttings automatically
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Drill straight, clean, ready-to-use holes at speeds up to 6 inches per minute—even through steel reinforced concrete. TILDEN Rotary Koncrete Kore Drills can be used with ordinary electric or rotary air drill. Free Factory sharpening and repair service still available on all Standard TILDEN Drills from 3/16" to 8-inch diameters. Interchangeable shanks for any depth hole.
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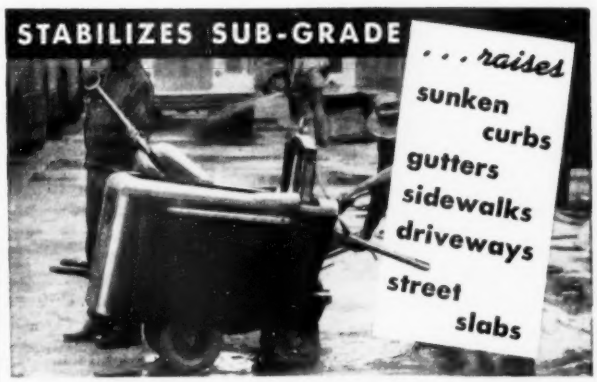

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To heat drums for the rapid and thorough removal of asphalt, McConnaughay has developed heaters which have capacities of 6, 12 or 24

Asphalt barrel heater

barrels at one time and storage tanks in capacities of 500, 1000, 2000 and 3000 gals. In addition to rapid heating, there is no fire hazard, the barrels are not damaged and can be re-used or sold, and time is saved by the preheating process. The heater has a barrel lifting device and a thermometer, and can be mounted on skids or pneumatic tires. Ask for data on the Model 24-S from K. E. McConnaughay, Painters & Decorators Bldg., Lafayette, Ind.

Use coupon on page 40; circle No. 4-12

• • •

New Bucket Ditcher Features a Fluid Coupling

Two improvements have been announced on the new Model 705-B Barber-Greene ditcher. One is a complete fluid coupling which slips and prevents damage if a heavy underground resistance is encountered, as boulders or large pipes. An even steady pressure gives better digging results, and control of progress on down-hill slopes. The new special curved-tooth bucket is

Digs 4 feet deep

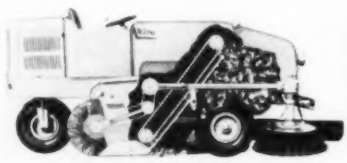
claimed to increase digging efficiency and more than double the normal digging life of the teeth. The 705-B digs to a depth of 4 ft. More from Barber-Greene Co., Aurora, Ill.

Use coupon on page 40; circle No. 4-13

• • •

Rubber Elevator Chains for Better Street Sweeping

Steel cable reinforced rubber drive chains for the dirt elevator are now standard equipment on all Wayne motor sweepers. These rubber chains are claimed to eliminate



How the sweeper works

elevator trouble, practically for the life of the sweeper. A center core of many high-alloy steel cables is incorporated in the chains, providing strength, wear resistance and shock absorbance. Full data from Wayne Mfg. Co., Pomona, Calif.

Use coupon on page 40; circle No. 4-14

• • •

Trencher with Hercules Gasoline Engine Power

Tests of the Parsons Model 88 Trenchmobile were made in more than 50 cities, during which time over 75,000 ft. of trench were dug under adverse conditions. Trenches were up to 5 ft. deep and 8 to 12

Parsons with Hercules power

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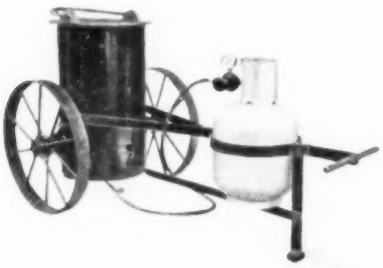
ins. wide. This trencher is equipped with a Hercules gasoline engine developing 43.6 hp at 2000 rpm. During the tests records were kept of oil and gasoline consumption, as well as costs of other items. Fuel consumption and operating costs were low, both in trenching and in moving to and from jobs. Data from Hercules Motors Corp., Canton 2, O.

Use coupon on page 40; circle No. 4-15

• • •

Lead Melting Furnace Uses Propane Gas

The new Pollard lead melting furnace burns liquefied petroleum, commonly known as bottled gas. It will melt about 100 pounds of lead in ten minutes and the burner can be adjusted to maintain the proper



Pollard's new melter

temperature. Pot has a capacity of 200 to 700 pounds of lead. Mounting is on wheels for easy transportation. For full details write Joseph G. Pollard Co., Inc., New Hyde Park, N. Y.

Use coupon on page 40; circle No. 4-16

• • •

Printing Traffic and Safety Lines on Pavements

By using an all-metal, sled-type roller spreader, traffic control lines can be printed directly on the pavement. The line is said to be very sharp and clean and to last longer. The machine is light and easy to handle and printing is offset to the side so that the operator has a clear view of the stripe at all times. More data from Line Marker Division, Universal Yonkers Corp., 137 Alexander St., Yonkers 2, N. Y.

Use coupon on page 40; circle No. 4-17

• • •

New 75 CFM Portable Air Compressor

Mounted on rubber tires and weighing only 1280 pounds, this newly developed air compressor is designed for either standby service or steady production. The 3-wheel trailer can be towed at high speed. Large lockable tool boxes are mounted on the sides. This unit will handle a 45-lb. paving breaker; or a 45-lb. rock drill; or two backfill tampers; or two clay spades; or other similar combinations. OK Clutch & Machinery Co., Florence St., Columbia, Pa.

Use coupon on page 40; circle No. 4-18

• • •

Starting San Francisco's New Sewage Treatment Plant

SEWAGE was first run through San Francisco's new North Point plant in limited amount on December 6, 1951, following completion of the preliminary tests. One unit at a time was placed in service until all units had been tested and found to be operating satisfactorily. By the end of December all treatment units, except the chlorination and odor control systems, were in full 24-hour operation. Raw sludge, initially discharged into the bay, was first pumped to the Southeast Plant on December 26th. Pre-chlorination for odor control was started in January and the exhaust air deodorizing system early in February. Post chlorination was deferred until the effect of offshore disposal of unchlorinated effluent on the coliform density of the receiving water could be evaluated but the facilities were operated for short periods to determine the effectiveness of the distribution of chlorinating solution in the effluent channel and the dispersion obtained in the post chlorination structure.

The plant was continued in full 24-hour operation to the end of the fiscal year. During this time 8,159 million gallons of sewage were treated at an average dry weather flow of 41 mgd and peak flows up to 90 mgd during storms. For the period in which tests were made, the suspended solids were reduced from 270 parts per million in the raw sewage to 87 parts per million in the effluent. During the first six months of operation 1270 cubic yards of grit and 695 cubic yards of screenings were removed.

Operation of the plant has been generally successful but, as is usual with large new installations, some changes have become necessary due to the character of the material handled and other unforeseen conditions. Odor nuisance in the plant has largely been confined to the screenings and sand handling facilities. Conditions have been greatly improved by increasing pre-chlorination dosage to 40 pounds per mil-

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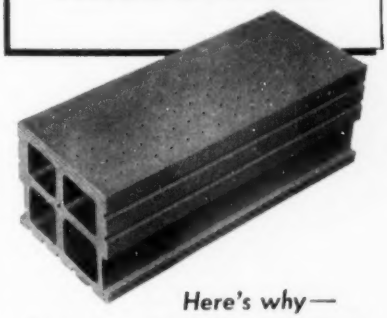

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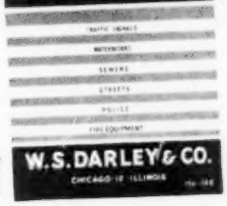

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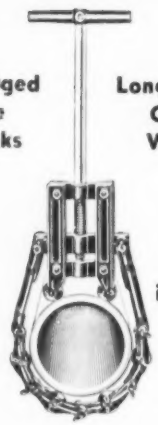

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lion gallons, by deodorizing equipment and screenings with a 1% solution of chloroben in water, by frequent floor washing, and by increasing the quantity of deodorant in the exhaust air systems.

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Refuse Collection and Disposal for Boston MDC

The Metropolitan District Commission serving the Boston area has been authorized to develop a metropolitan system of refuse disposal and to build, maintain, and operate five incinerators for 17 cities and towns, including Boston. The Commission was created 60 years ago but has been limited to sewerage, water works, and parks. Authorization by the Legislature ended several years of pressure from individual cities and towns faced with rising costs and dwindling land areas for refuse disposal. Cities and towns in the MDC will be assessed annually in proportion to the volume of refuse contributed.

• • •

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A graduate sanitary engineer desires a broader opportunity for service. He is under forty and has had fifteen years of experience in sanitary engineering, including six years in the design, development and operation of treatment units for numerous industrial wastes. He has also had construction experience, and served in the Sanitary Corps during World War II. Write to the Editor, Public Works Magazine, who will forward all letters. Mark letters "Industrial Waste Engineer."

• • •

Director of Public Utilities

The City of Middletown, Ohio, requests applications for the position of Director of Public Utilities. Responsibilities include supervision of the water supply and distribution system; assistance on the design of a sewage treatment plant to be built in 1954, and operation of the plant after construction; and other administrative duties. Applicant should have considerable experience in municipal public utility activities, and should be a registered professional engineer in Ohio or equivalent. Monthly salary range is $591 to $709. For further data apply to H. W. Starick, City Manager, Middletown, Ohio.

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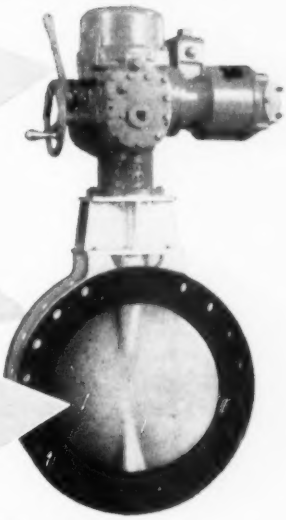

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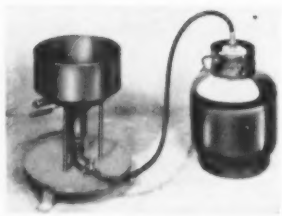

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Worth Telling

by Arthur K. Akers

★ **LOUIS F. FRAZZA,** prominent New Jersey engineer, is now staff manager of the Transite Pipe Department, JOHNS-MANVILLE CO.

★ **HERE** is CHARLES G. RICHARDSON, vice president of BUILDERS-PROVIDENCE, receiving a watch and

billfold (full, we trust) from HENRY S. CHAFEE, treasurer of the company, on completion of Charlie's first half century with Builders. We hope the next half serves them both equally well.

★ **EVERY TIME** we get a good group picture, like "QUICK-WAY" TRUCK SHOVEL CO.'S officials and district representatives meeting in Denver, we regret all over again that we can't crowd twenty-five good-looking men into a two-column cut and leave them recognizable.

★ **SPEAKING** of group pictures, there has been a rash of such meetings—and pictures—lately. Among the better photographs received are those sent by AEROIL PRODUCTS CO., South Hackensack, N.J.; The HEIL CO., Milwaukee; PEERLESS PUMP DIVISION, at Indianapolis; and ENTERPRISE DIESEL SALES group at Diablo, Calif.

★ **BENDIX RADIO COMMUNICATIONS DIVISION** of Bendix Aviation has moved headquarters for sales east of the Mississippi to 2120 North Charles Street, Baltimore. West Coast sales continue to be handled from North Hollywood, Calif.

★ **CAPITAL AIRLINES** has inaugurated a daily through flight from New York to Grand Rapids that should come in handy for Easterners going to the A.W.W.A. convention in Grand Rapids next month. See us aboard this Flight 431, May 9.

★ **"GALION MAKES THE GRADE"** is the title of a new 16 mm color, sound movie. Write The GALION IRON WORKS & MFG. CO., Galion, Ohio, when you want to show it.

★ **THOR POWER TOOL COMPANY** is the new name of the former INDEPENDENT PNEUMATIC TOOL CO., Aurora, Ill.

★ **KOPPERS COMPANY,** Pittsburgh, has appointed GEORGE W. NAYLOR assistant vice president and assistant sales manager, Tar Products Division.

★ **HERBERT J. HOWERTH JR.** is named assistant sales manager of the Wayne Division of GAR WOOD INDUSTRIES, INC.

★ **NEXT TIME** we go to see LAYNE & BOWLER CO. in Memphis we hope to omit trained guides through their maze of new construction and fetch up in their new office building, intact and un-lost.

★ **G. A. TAMBLYN** is new sales manager of the FRANK G. HOUGH CO., Libertyville, Ill.

Mr. Tamblyn

Mr. Bard

★ **PRESIDENT F. N. BARD** of BARCO MFG. CO., announces their removal from Chicago to 500 N. Hough St., Barrington, Ill.

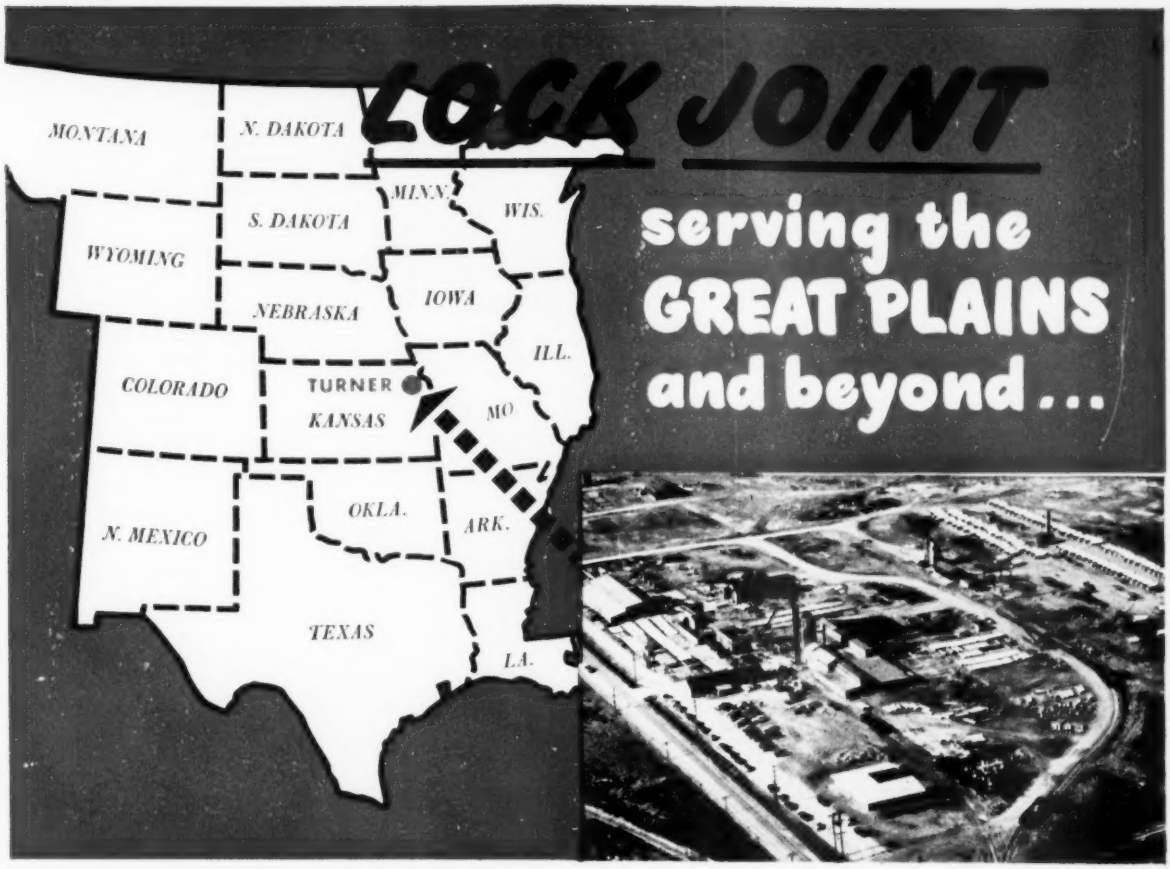
★ **ARTHUR B. MOBLEY** will now assist Manager Director E. W. BAUMAN in putting blast furnace slag more fully into its proper place in the construction and sewage treatment world. NATIONAL SLAG ASSOCIATION, Washington, D.C., is their home base.

★ **BENNETT CERF** tells of a frustrated Ozarks mountaineer who wrote in his diary:

Monday, Nov. 8—Raining. Can't go hunting.

Tuesday, Nov. 9—Raining. Can't go hunting.

Wednesday, Nov 10—Raining. Shot grandma.



FROM THE CANADIAN BORDER TO THE GULF OF MEXICO... from the Rockies to Lake Michigan, the Ohio and Mississippi Rivers ... this is the broad sweep of the Great Plains served by Lock Joint's permanent pipe manufacturing plant at Turner, Kansas. Specializing in Lock Joint Prestressed Concrete Cylinder Pipe in diameters from 16" to 48", designed for any pressure common to water works practice, the Turner plant also answers demands for this type of pipe in the Great Lakes area.

...LOCK JOINT CONCRETE PRESSURE PIPE is readily available east of the Mississippi from the Company's three other permanent plants in Wharton, N. J.; Detroit, Mich., and Columbia, S. C. Together these four strategically located plants are equipped to handle any contract, however large or small, and offer the ultimate in modern Concrete Pressure Pipe in a variety of standard diameters.

SCOPE OF SERVICES—Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply and Distribution Mains 16" in diameter or larger, as well as Concrete Pipes of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous Lines.

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